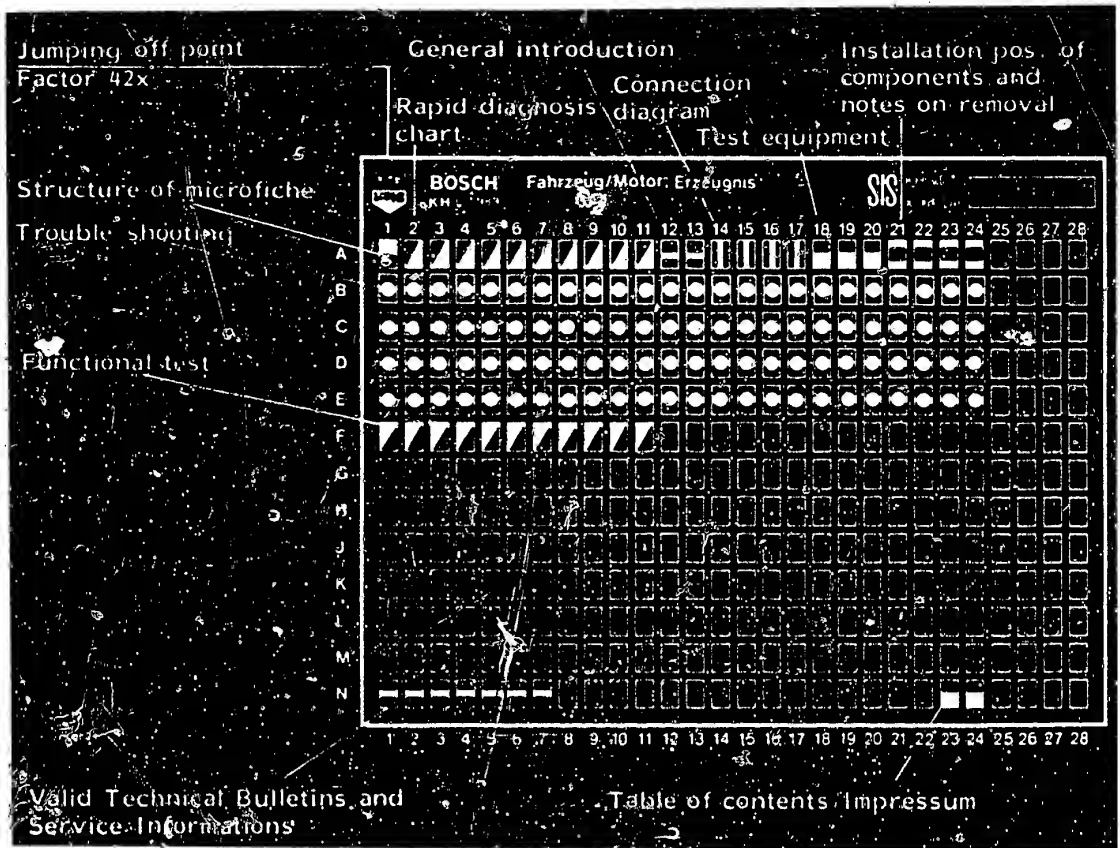


# Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

<b>E16</b>	Product/component/test step
	Vehicle/engine

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6



Trouble-shooting chart



## 1. Rapid diagnosis chart

The following rapid diagnosis chart makes it possible for the experienced expert to quickly test the trip computer and the associated sensors/sensor signals using normal workshop test equipment.

To do this, the universal test adapter is connected between trip computer and vehicle wiring harness using the adapter lead.

The contents of this chart refer to the following information:

- sequence of test steps
- switch/switch position on the universal test adapter
- test instructions and test specifications
- references to coordinates of the respective detailed testing and trouble-shooting program.

If detailed information and instructions are necessary, always proceed according to the trouble-shooting program starting on Coordinate B 1.



## Requirements for testing

- Check the customer complaint.  
(Check operation of trip computer according to vehicle owner manual;  
see Coordinates B 3 - B 6 up to 6.84  
B 7 - B 14 as of 6.84 for extract).
- Electrical system (fuses, battery voltage O.K.)
- When working on the fuel system, observe accident prevention regulations as well as environmental and health regulations.
- Check all functions with the vehicle stationary and before removing the trip computer.
- Passenger compartment temperature  $\geq 0^{\circ}\text{C}$ .
- Original transmission/differential installed (otherwise change of distance per number of revolutions).
- Original tires (14") mounted (changed rolling circumference means change of distance per number of revolutions). Observe air pressure.
- Engine and injection system not tuned (allocation of input signals to fixed computer program of trip computer may change. Trip computer then shows incorrect readings).



# Rapid diagnosis chart with adapter lead KDES 0003

Test step	Switch position	Measurement	Remarks	Connection on 26-pole plug	Test specifications Indications	Coordinates
1	↓	1 Ground test, TC	Plug of adapter lead on TC is connected	2	0...10 Ω	C 1
2	↓	13 Ground test, temperature sensor	Plug of adapter lead on TC is connected	12	0...10 Ω	C 3
3	↓	14 Ground test, displacement pickup	Plug of adapter lead on TC is connected	25	0...10 Ω	C 5
4	↓	15 Resistance, tank sensor	Plug of adapter lead on TC is connected	26	30...290 Ω	C 7
5	↓	16 Encoding lead 2 17 → 3	Plug of adapter lead on TC is detached when replacing 0 263 001 002, 003 014, 015	17	0...10 Ω	C 11
6	↓	17 Encoding lead 3 18 → 3	Plug of adapter lead on TC is detached when replacing 0 263 001 014, 015	18	0...10 Ω	C 13
7	↓	18 Encoding lead 4 19 → 3	Plug of adapter lead on TC is detached when replacing 0 263 001 000, 001, 002, 003, 006 007	19	0...10 Ω	C 15
8	↓	20 Encoding lead 5 8 → 9	Plug of adapter lead on TC is detached when replacing 0 263 001 006, 007, 008, 009	8	0...10 Ω	C 17
9	↓	21 Encoding lead 6 10 → 9	Plug of adapter lead on TC is detached when replacing 0 263 001 000, 001, 002, 003, 010, 011, 014, 015,	10	0...10 Ω	C 19

**A4**

Rapid diagnosis chart  
Opel trip computer

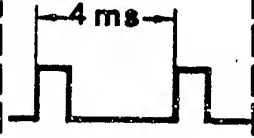
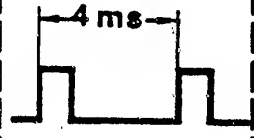
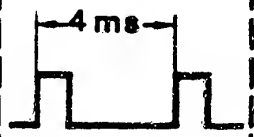


**A5**

Rapid diagnosis chart  
Opel trip computer



# Rapid diagnosis chart (continued)

Test step	Switch position	Measurement	Remarks	Connection on 26-pole plug	Test specifications Indications	Coordinates
10	-	-	Operating element: press time button Plug of adapter lead on TC is detached 23 → 1 Resistance measurement at sockets 1 + 2	23	0 Ω	C 5
11	↓	10	Operating element: press TC function button Plug of adapter lead on TC is detached 22 → 1	22	0...10 Ω	D 1
12	↓	9	Operating element: press starter button Plug of adapter lead on TC is detached 20 → 1	20	0...10 Ω	D 5
13	3	-	Operating element Plug of adapter lead attached to TC Pulsed voltage	1		D 9
14	4	-	Encoding lead 0 Plug of adapter lead attached to TC Pulsed voltage	3		D 11
15	7	-	Encoding lead 1 Plug of adapter lead attached to TC Pulsed voltage	9		D 13

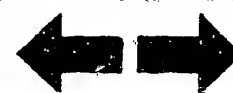
**A6**

Rapid diagnosis chart  
Opel trip computer

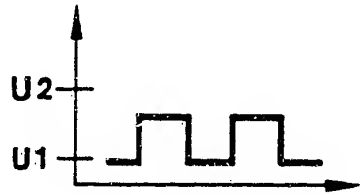


**A7**

Rapid diagnosis chart  
Opel trip computer



# Rapid diagnosis chart (continued)

Test step	Switch position		Measurement	Remarks	Connection on 26-pole plug	Test specifications Indications	Coordinates
	V	$\Omega$					
16	8	-	Displacement pickup	Visual	21		D 15
				Inductive			
17	9	-	Voltage supply for TC from term. 30	Plug of adapter lead attached to TC	14	Battery voltage	D 17
18	10	-	Voltage supply for TC via term. 15	Plug of adapter lead attached to TC Ignition on	11	Battery voltage	D 21
19	11	-	TC illumination as of 6.84	Plug of adapter lead attached to TC Ignition on	15	Battery voltage	D 23
			TC illumination up to 5.84	Running light on, actuate regulator for instrument lighting	15	approx. 8...12 V	
20	12	-	Ambient temperature sensor: at higher temperature lower voltage	Plug of adapter lead attached to TC Ignition on Ambient temperature approx. +20°C	13	approx. 1.7 V	E 3

**A8**

Rapid diagnosis chart  
Opel trip computer



**A9**

Rapid diagnosis chart  
Opel trip computer



# Rapid diagnosis chart (continued)

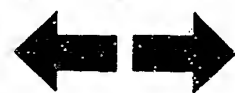
Test step	Switch position		Measurement	Remarks	Connection on 26-pole plug	Test specifications Indications	Coordinates
	V	$\Omega$					
21	13	-	Voltage stabilization Fuel gauge	Plug of adapter lead on TC is detached Plug detached at tank sensor Ignition on	26	10 V	E 5
22	13	-	Tank sensor voltage	Plug of adapter lead attached to TC Ignition on Tank full Tank 3/4 full Tank 1/2 full Tank 1/4 full Tank on reserve Tank empty	26	approx. 4.2 V approx. 5.4 V approx. 6.2 V approx. 7.4 V approx. 8.0 V approx. 8.4 V	E 7
23	14	-	Injection signal ( $t_j$ )	Plug of adapter lead attached to TC Ignition oscilloscope Special input	24	$t_j$ signal present	E 11
24	15	-	Engine-speed relay term. 87	Plug of adapter lead attached to TC Ignition on	6	0 V	E 13
25	15	-	Engine-speed relay term. 87	Plug of adapter lead attached to TC Engine running	6	Battery voltage	E 15

Additional test steps for TC up to 6.84 with adapter lead KDES 0002

26	-	13	Ground test, encoding lead 1 if provided	Plug of adapter lead on TC is detached	4	0...10 $\Omega$	E 19
27	8	-	Operating element: press button for instrument lighting	Plug of adapter lead attached to TC Ignition on	16	5 V → 0 V	E 21

**A10**

Rapid diagnosis chart  
Opel trip computer



**A11**

Rapid diagnosis chart  
Opel trip computer



## 2. General introduction

As of mid 1984 Opel has been supplying the Senator and Monza with a trip computer (TC) as an optional extra. This trip computer takes over from the previously commercially available types.

BOSCH components are:

Trip computer with control and evaluation electronics. (Installed in instrument panel).

Outside temperature sensor. NTC resistor in bracket (installed at front under bumper).

Operator keyboard (installed to right of driver's seat).  
(without illumination button).

The outside temperature sensor and operator keyboard are identical for both vehicles.

The trip computer must be matched to the respective vehicle by means of a selector switch (on the side).





The following functions can be called up one after the other using the keyboard:

1. Actual fuel consumption per 100 km
2. Average fuel consumption per 100 km
3. Average speed
4. Range based on actual fuel consumption
5. Stopwatch function
6. Outside temperature
7. Time
8. Self-check as of 6.84

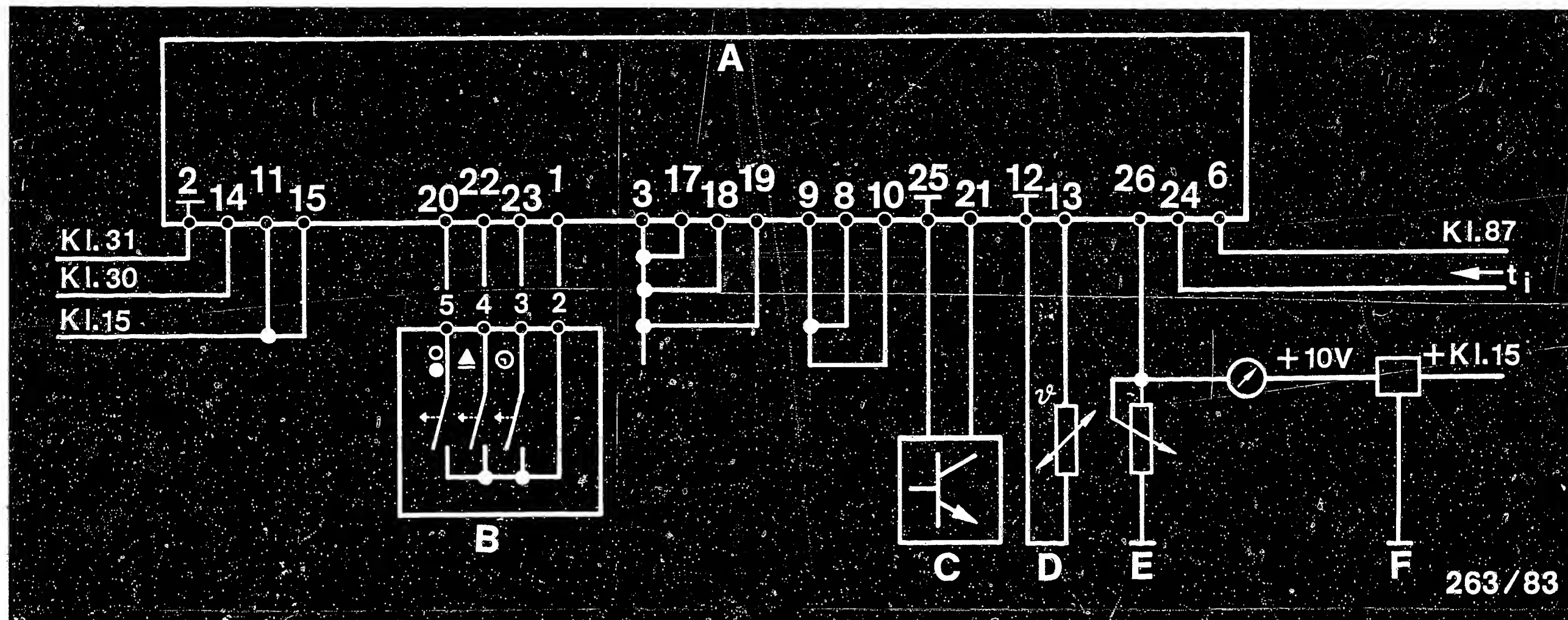
The following signals are used as measured variables:

1. Resistance of NTC resistor in temperature sensor (Bosch)
2. Duration of injection  $t_i$  of L-Jetronic (Bosch)
3. Speed signal from speedometer (Opel)
4. Voltage of tank sender (Opel)

The timer functions for clock and stopwatch are generated internally in the trip computer. They are processed together with other signals in the trip computer to calculate functions 3 and 5.







3.1 Connection diagram (terminal connections) of trip computer as of 6.84

**A16**

Connection diagram

Opel trip computer



**A17**

Connection diagram

Opel trip computer



#### 4. Test equipment

Universal test adapter

0 684 101 801

Adapter lead

KDES 0002

KDES 0003

Motortester e.g. MOT 201

0 684 000 201

Multimeter

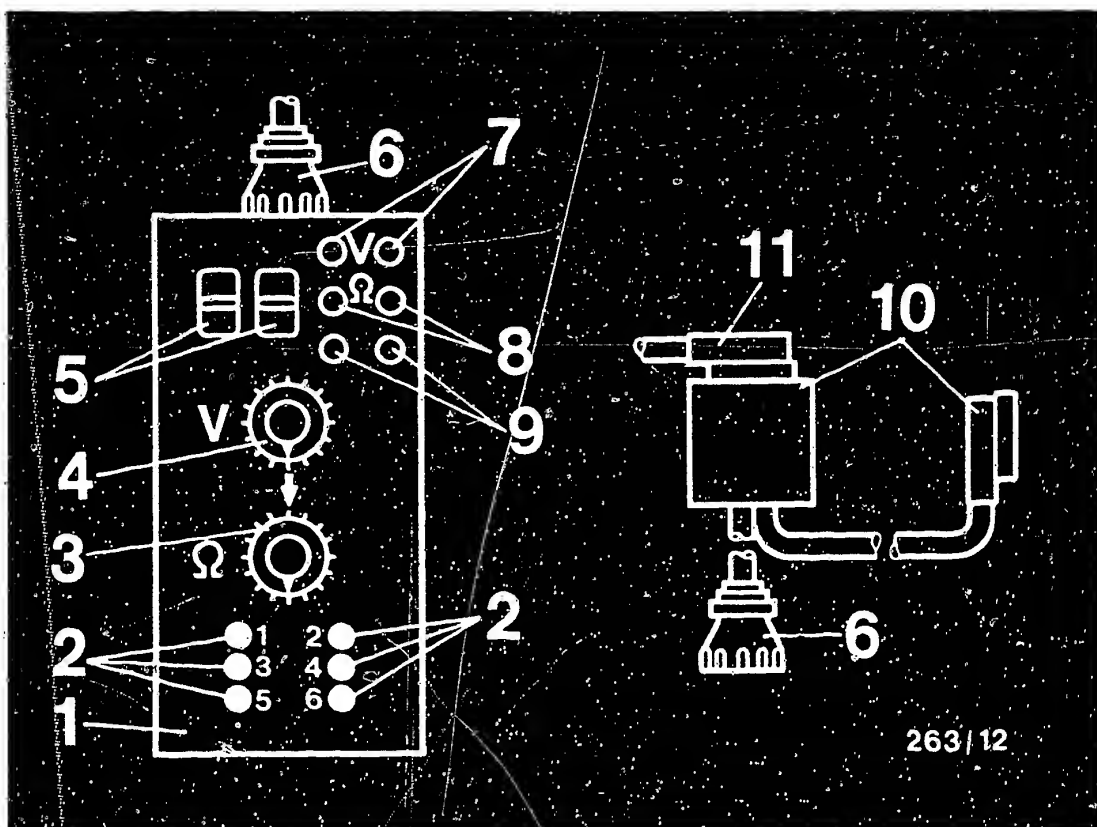
Commercially  
available

**A18**

Test equipment

Opel trip computer



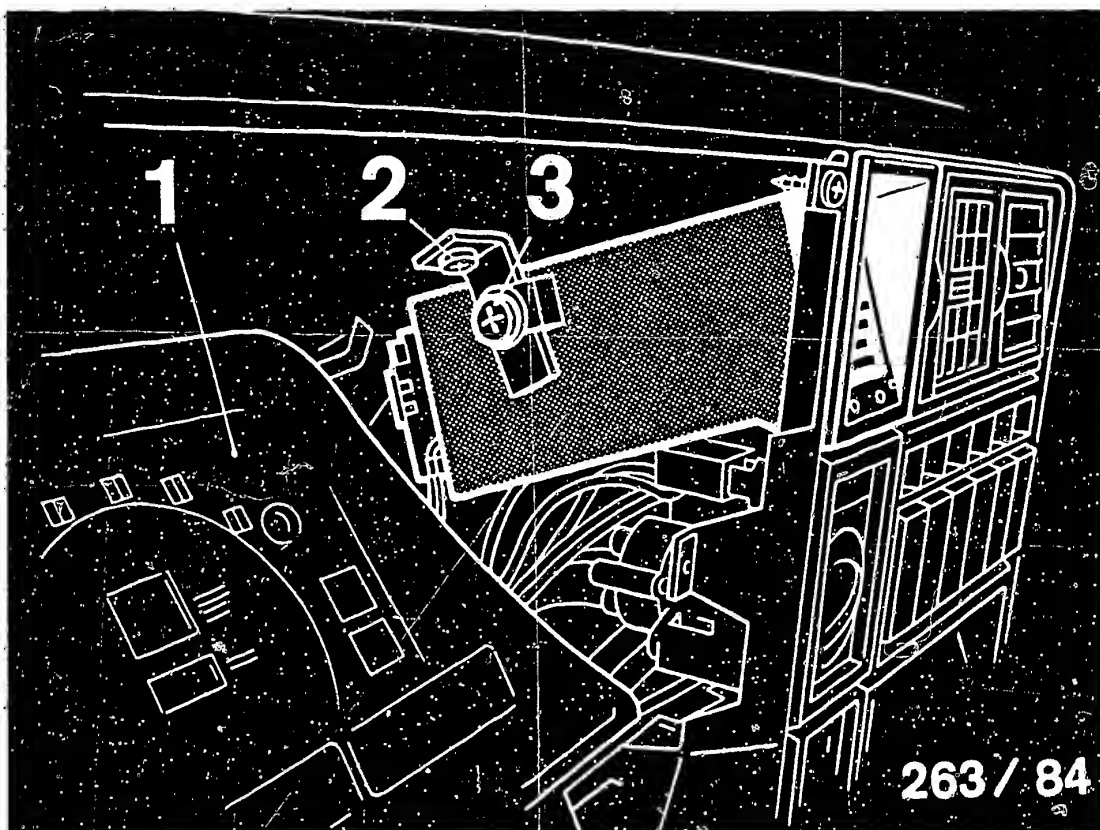


263/12

- 1 = Universal test adapter 0 684 101 801
- 2 = Simulation keyboard
- 3 = Program switch for resistance measurements
- 4 = Program switch for voltage measurements
- 5 = Measuring sockets for special input from Motortester
- 6 = 63-pole plug-in connection for adapter lead
- 7 = Measuring sockets for voltage measurement
- 8 = Measuring sockets for resistance measurements
- 9 = Sockets for special functions (not used yet)
- 10 = Adapter lead KDES 0002 or KDES 0003 with 26-pole plug
- 11 = 26-pole plug from vehicle wiring harness

#### 4.1 Universal test adapter with adapter lead KDES 0002 or KDES 0003





1 = Instrument cluster  
2 = Mounting bracket

3 = Recessed-head screw

#### 4.2 Connecting the adapter lead KDES 0002 or KDES 0003

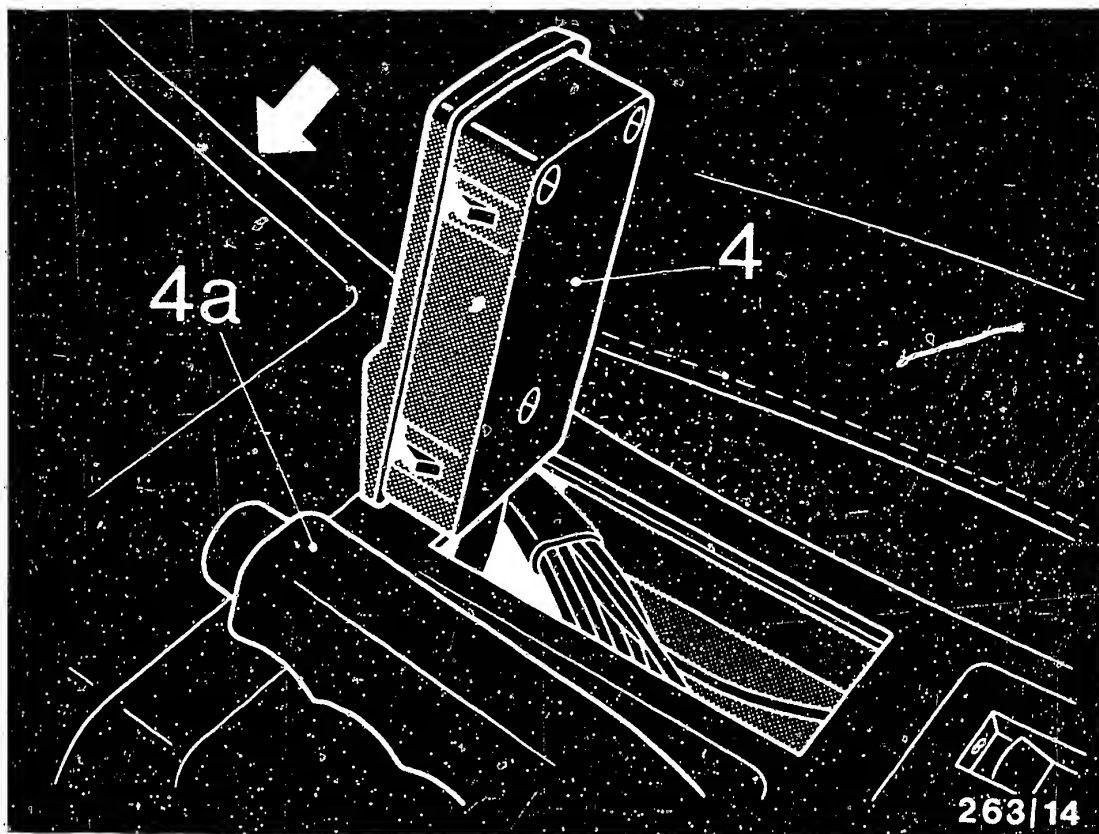
Remove 4 screws from speedometer panel (1) (2 screws at bottom are covered by plugs) and remove panel from above between steering wheel and windshield.

Remove screw (3) and remove trip computer from the front.

Remove plug and connect to adapter lead KDES 0002 or KDES 0003.

Plug 26-pin plug of adapter lead KDES 0002 or KDES 0003 onto trip computer.





4 = Operator keyboard

4a = Handbrake

#### 5. Installation position of components and notes on removal

The trip computer is in the instrument panel in place of the digital clock, right of the instrument cluster.

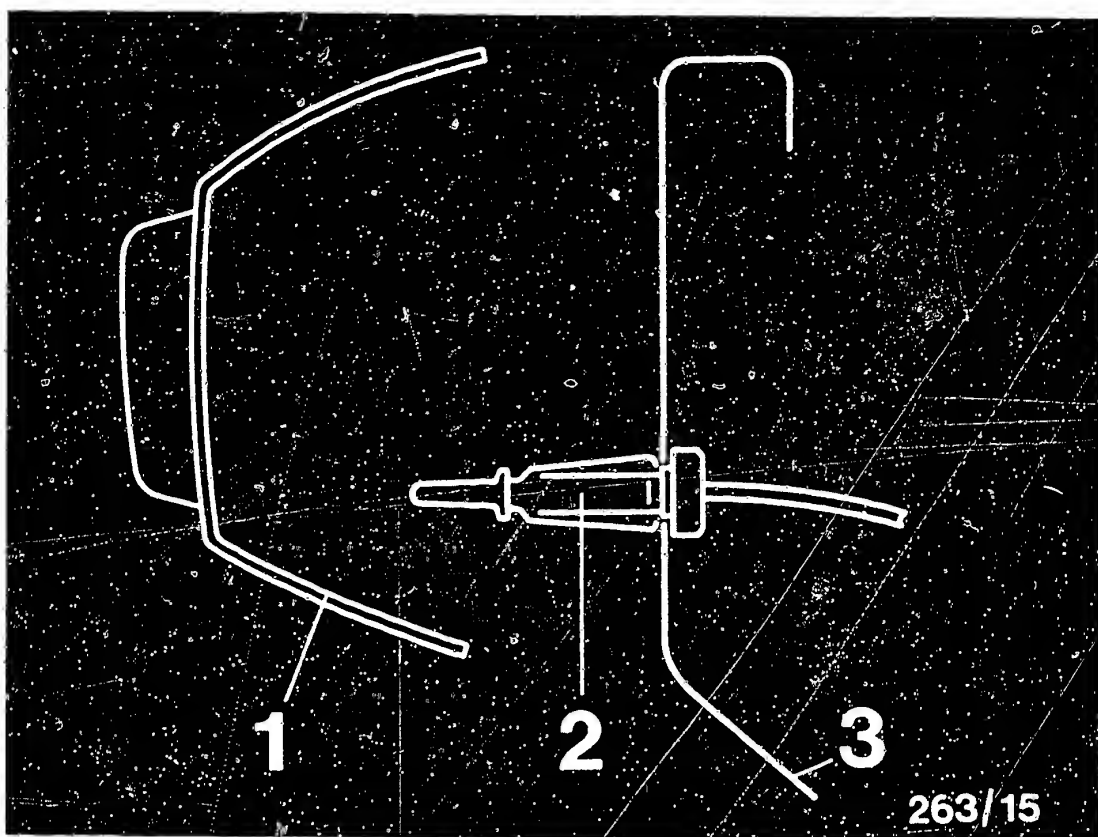
The operator keyboard is sunk into the center console right of the handbrake (see picture).

To remove the operator keyboard, unscrew the center console and pull slightly to the rear. Undo the plug connector between operator keyboard and wiring harness at the front on the right-hand side behind the center console (arrow, picture). Using a screwdriver, carefully raise the operator keyboard and remove (see picture).

**A21**

Installation position of components  
Opel trip computer





1 = Front bumper

3 = Front spoiler

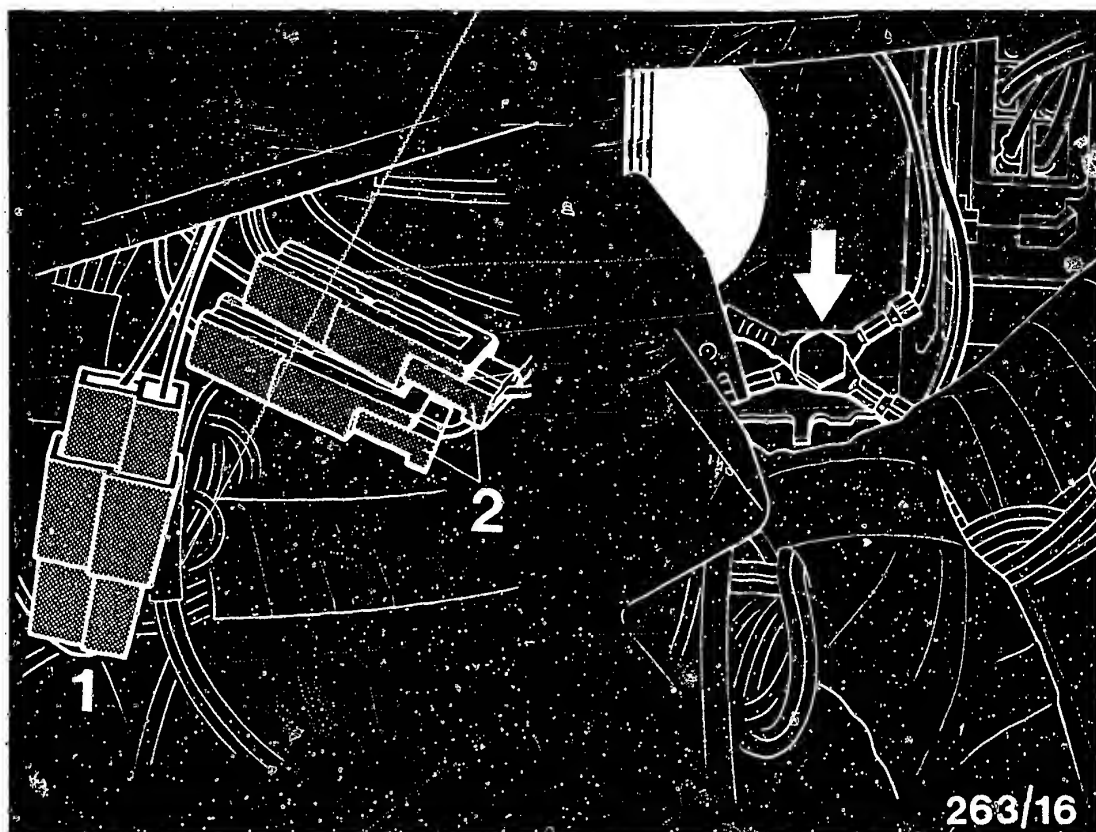
2 = Temperature sensor

The outside temperature sensor is installed in the front spoiler behind the bumper (see picture).

To remove, press together the two sprung latching lugs and withdraw the outside temperature sensor from the rear.

The plug connection in the electric lead is behind the instrument cluster.





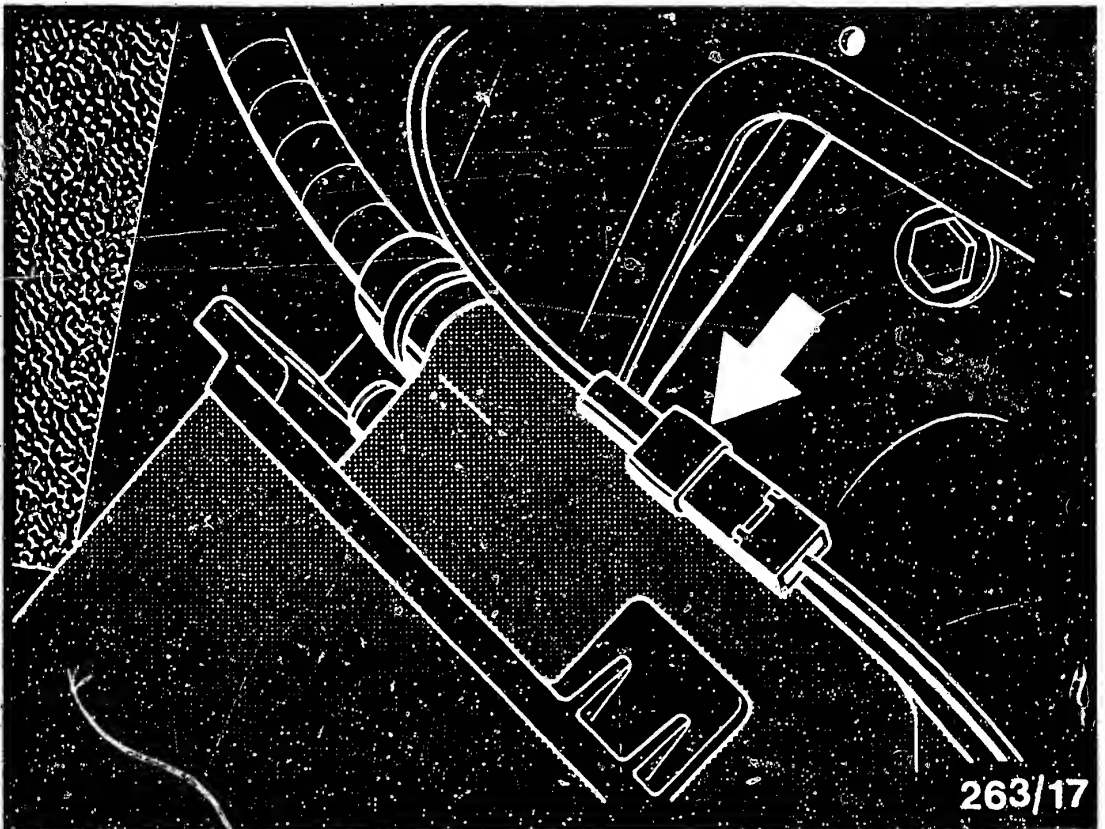
1 = Tank sender

2 = Outside temperature sensor

The connections of the trip computer wiring harness are behind the instrument cluster (left-hand picture).

The central ground (arrow, right-hand picture) is behind the cardboard cover behind the instrument panel on the front passenger side.

The connections for terminal 15 and terminal 30 are on the fuse box.



The plug connection in the lead of the injection signal  
(see picture, arrow) is next to the L- or version LE-  
Jetronic control unit.

This is accommodated on the right hand firewall in front  
of the front passenger seat.

**A24**

Installation position of components

Opel trip computer



## 6. Trouble-shooting

Trouble-shooting comprises:

- Functional test of trip computer
- Trouble-shooting according to fault symptoms (customer complaint)
- Removal of trip computer
- Vehicle adjustment of trip computer
- Setting the time
- Setting the range (miles to empty)
- Test with universal test adapter



## Requirements for testing

- Check the customer complaint.
- Electrical system (fuses, battery voltage) O.K.
- When working on the fuel system, observe accident prevention regulations as well as environmental and health regulations.
- Check all functions with the vehicle stationary and before removing the trip computer.
- Passenger compartment temperature  $\geq 0^{\circ}\text{C}$ .
- Original transmission/differential installed (otherwise change of distance per number of revolutions).
- Original tires (14") mounted (changed rolling circumference means change of distance per number of revolutions). Observe air pressure.
- Engine and injection system not tuned (allocation of input signals to fixed computer program of trip computer may change. Trip computer then shows incorrect readings).



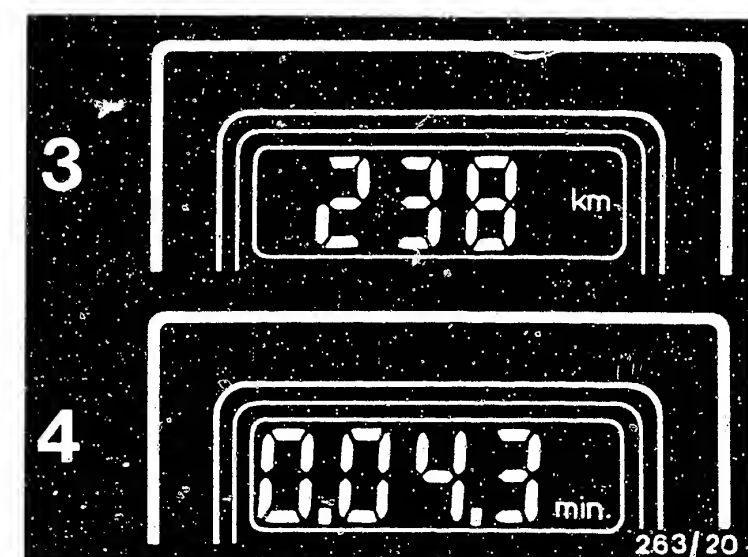
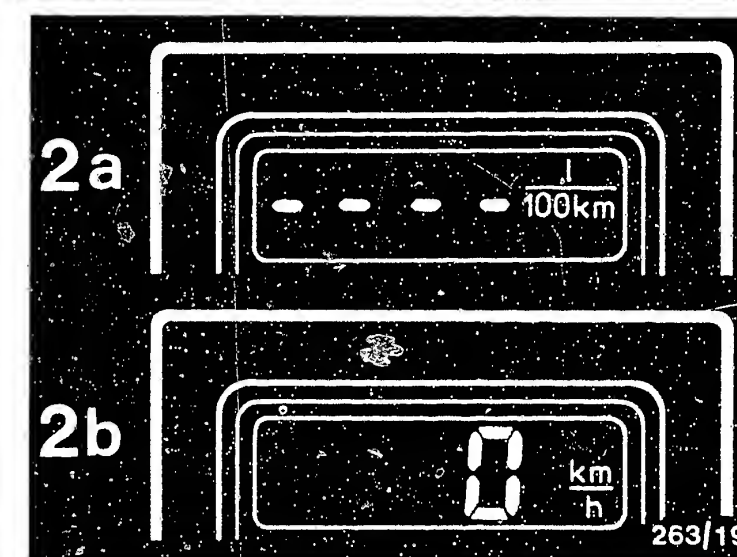
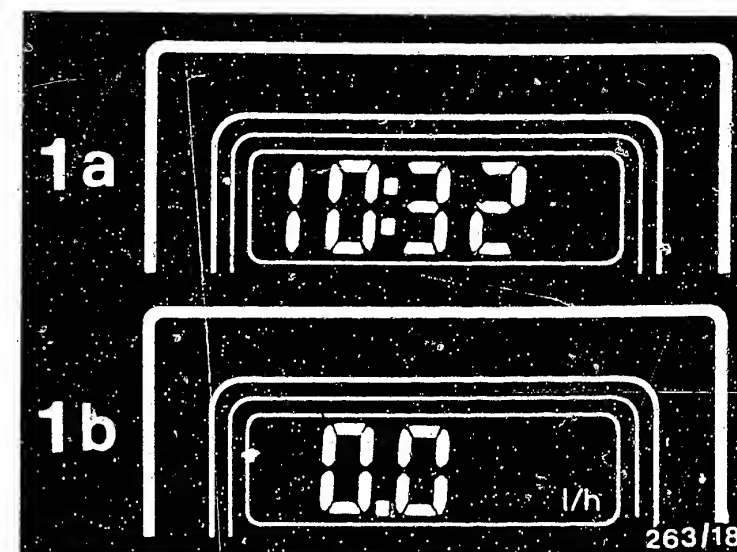
## 6.1 TC functional test (extract from operating manual) up to 6.84

### Functional test with ignition 0 F F

1. Time only is indicated.  
No other functions can be selected (see Fig. 1 a).

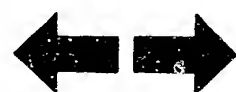
### Functional test with ignition 0 N - engine not running, start button was pressed.

1. Time continues to be indicated if other TC function is not selected (if range > 50 km and battery not disconnected) (see Fig. 1 a).
2. Selection of "inst. consumption". Inst. consumption 0.0 l/h is indicated (vehicle and engine stopped) (see Fig. 1 b).
3. Selection of "consumption 0". No average consumption is displayed (see Fig. 2 a).
4. Selection of "speed 0". Average speed 0 km/h is indicated (vehicle stopped), (see Fig. 2 b).
5. Selection of "range". Range is indicated in line with tank capacity (see Fig. 3).
6. Selection of "stopwatch". Time as of actuation of start button is indicated (see Fig. 4).
7. Selection of "ambient temperature". The actual ambient temperature is displayed (not illustrated).



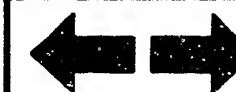
**B3**

Trouble-shooting, functional test  
Opel trip computer



**B4**

Trouble-shooting, functional test  
Opel trip computer

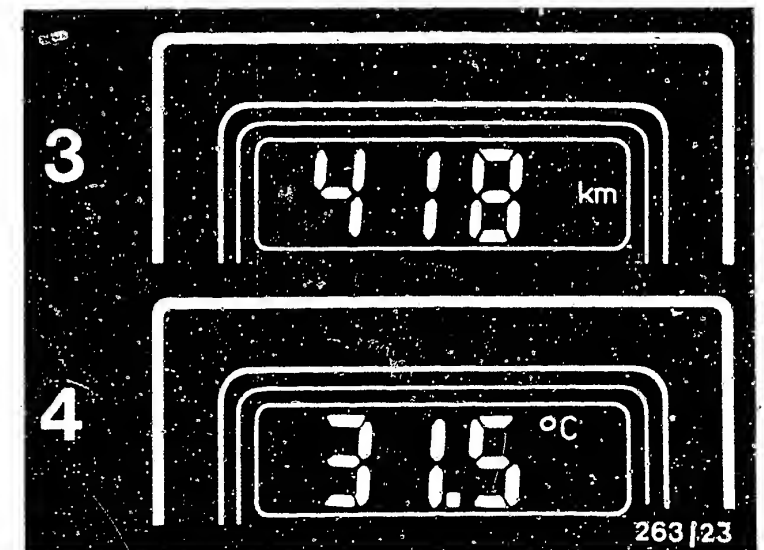
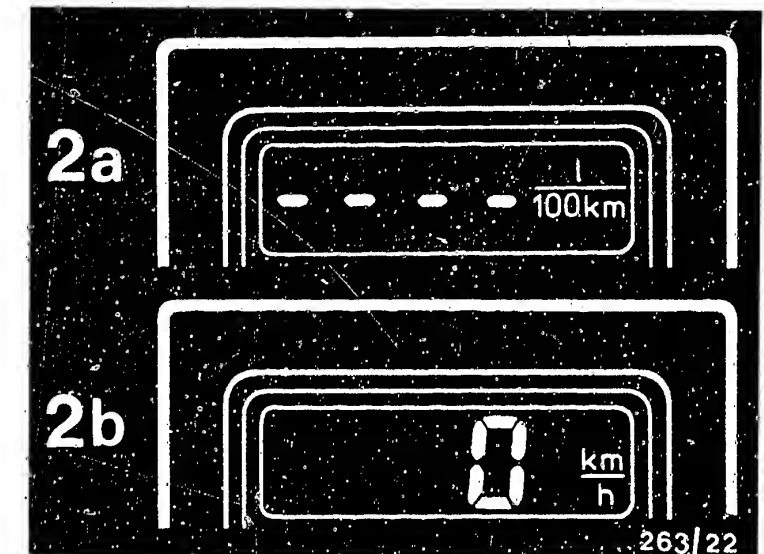
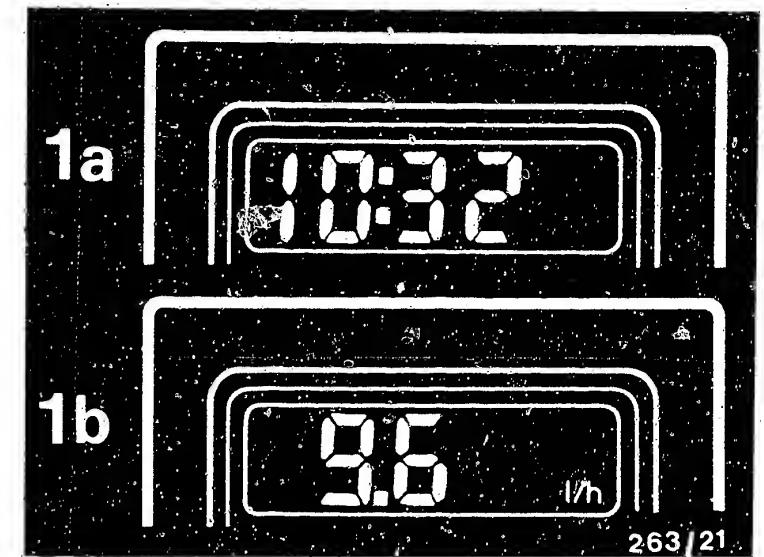


Functional test - engine running (idle speed), vehicle stopped

Start button pressed.

1. The time is indicated when the time selection button is pressed (see Fig. 1 a).
2. The actual instantaneous consumption in l/h is indicated when "inst. consumption" is selected (see Fig. 1 b).
3. ---- 1/100 km is indicated when "consumption 0" is selected (vehicle not moving) (see Fig. 2 a).
4. 0 km/h is indicated when "speed 0" is selected (vehicle not moving) (see Fig. 2 b).
5. A value corresponding to the tank capacity is indicated when "range" is selected (value between 0 and approx. 600 km) (see Fig. 3).
6. Time as of actuation of the start button is indicated when "stopwatch" is selected (not illustrated).
7. The actual ambient temperature is indicated when "ambient temperature" is selected (see Fig. 4).

If all these functions can be selected, the TC, the operating element and the input signals are O.K.



**B5**

Trouble-shooting, functional test  
Opel trip computer



**B6**

Trouble-shooting, functional test  
Opel trip computer



## 6.2 Functional test of trip computer (extract from owner's manual) as of 6.84

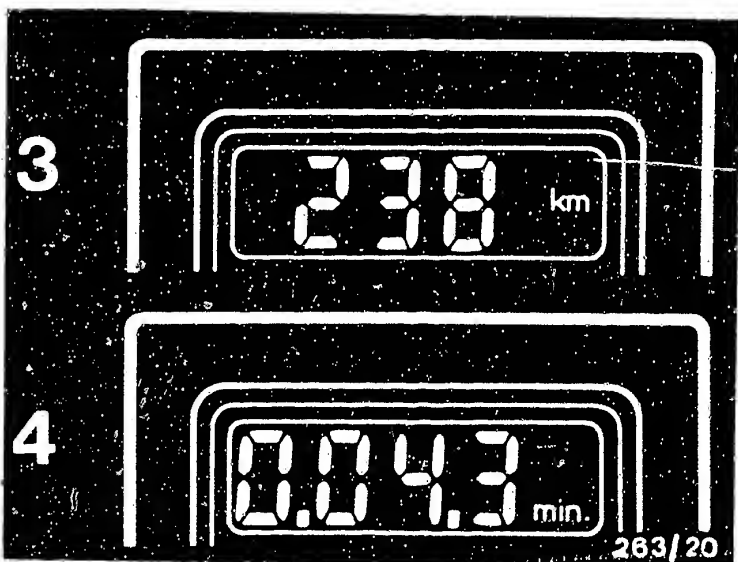
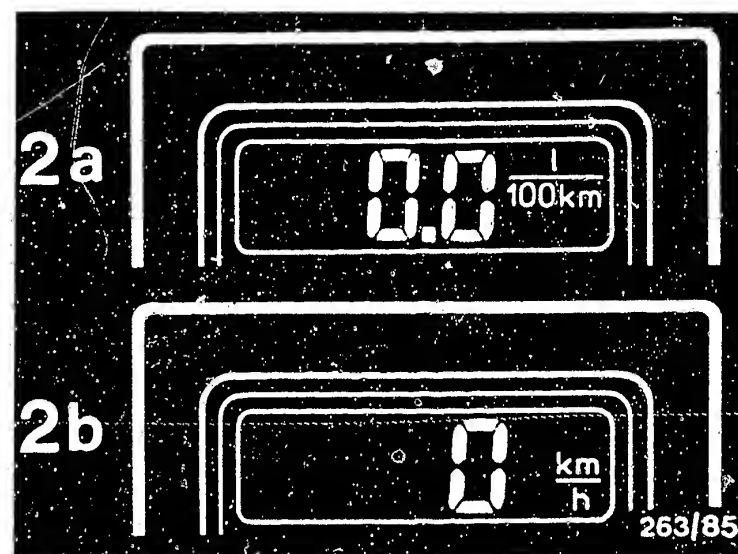
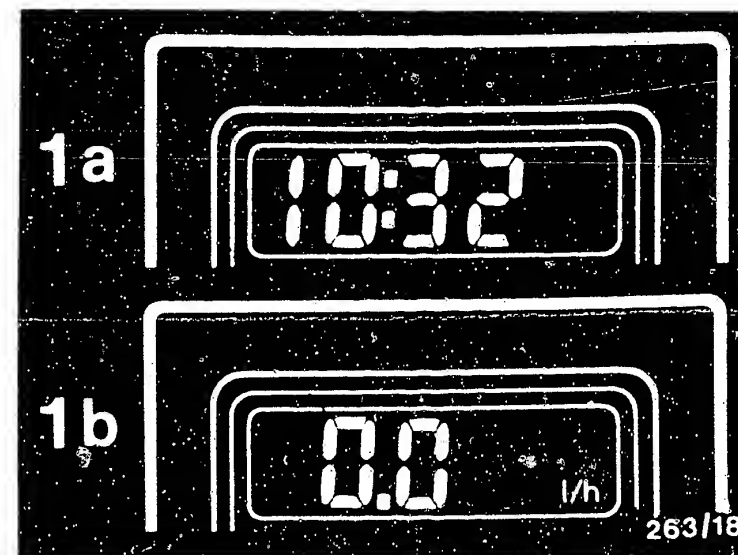
### Functional test with ignition 0 F F

1. Only time is displayed.

It is not possible to select any other functions (see Fig. 1a).

Functional test with ignition 0 N - engine not running, start button has been pressed.

1. Without selecting another trip computer function, time continues to be displayed (if range > 50 km and battery not disconnected) (see Fig. 1a).
2. Select "actual consumption". Actual consumption 0.0 l/h is indicated (vehicle and engine stopped). (see Fig. 1b)
3. Select "ave. consump.  $\emptyset$ " : last stored value is indicated  
Select "ave. speed  $\emptyset$ " : last stored value is indicated
4. Press start button > 1 sec until 3 arrows appear.
  - 4.1 Ave. consumption  $\emptyset$  : 0.0 l/100 km (see 2 a)
  - 4.2 Ave. speed  $\emptyset$  : 0 km/h is indicated (see 2 b)
5. Select "range". (Miles to empty)
  - 5.1 After connecting  $V_{\text{Batt}}$  the range is calculated from ave. km (Fig. 3)  
( $\approx$  ave. 1 tank capacity) within 10 min.  
After connecting Term. 15 an extrapolation is made to the actual value.
  - 5.2 After a driving time > 30 min a range is indicated which is calculated from the fuel in the tank and the driving style of the driver.
  - 5.3 After refueling, the new fuel level in the tank can be taken over for calculations by pressing the start button > 1 sec.
6. Select "stopwatch". A time is indicated as of pressing the start button (see Fig. 4).
7. Select "outside temperature". The actual outside temperature is indicated (no figure).



**B7**

Trouble-shooting, functional test  
Opel trip computer



**B8**

Trouble-shooting, functional test  
Opel trip computer



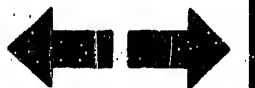
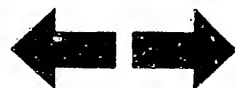
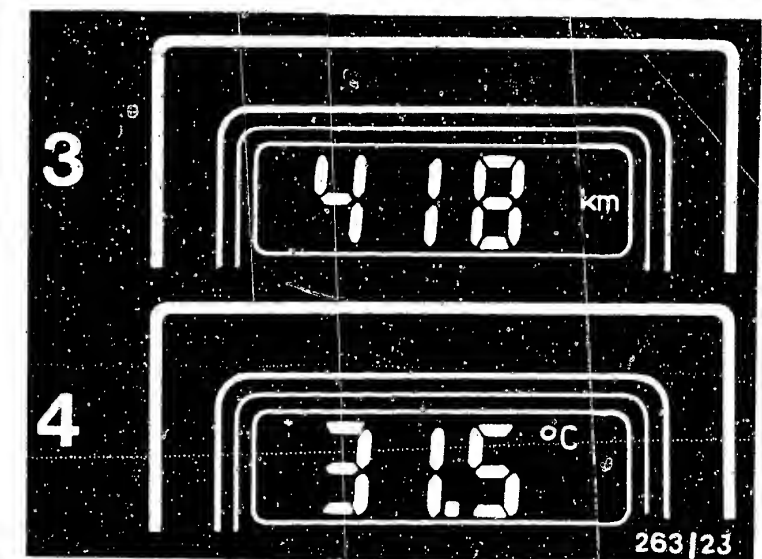
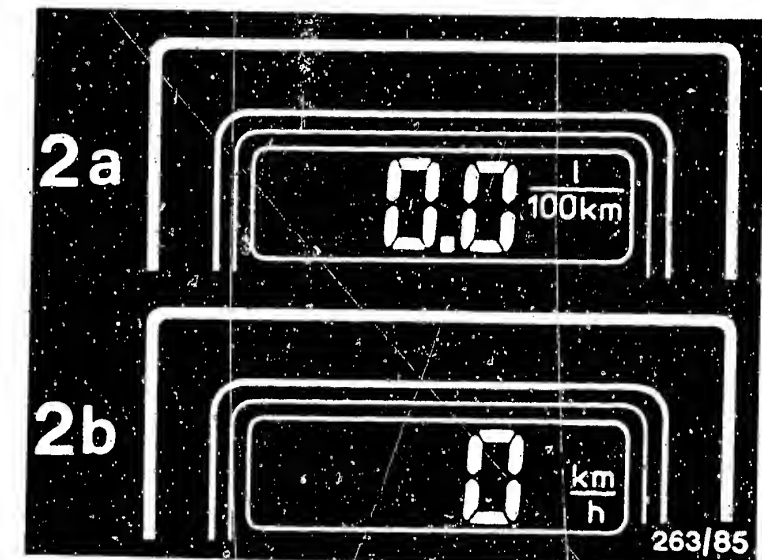
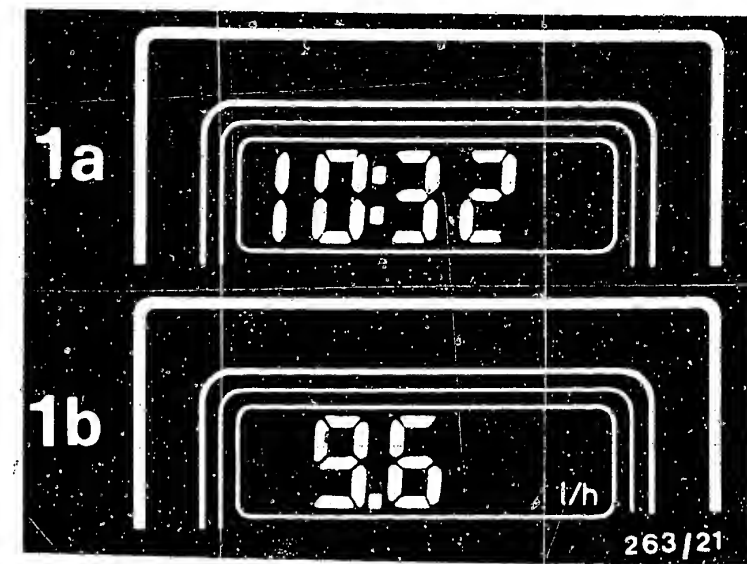


Functional test - engine running (idle speed), vehicle stationary

Start button has been pressed.

1. When priority button is pressed, time is indicated (see Fig. 1a)  
If pressed a second time, the previous display is indicated.
2. When "actual consumption" is selected, the actual consumption is indicated in l/h (see Fig. 1b)
3. When "average consumption" is selected, 0.0 l/100 km is indicated (vehicle stationary) (see Fig. 2a).
4. When "average speed" is selected, 0 km/h is indicated (vehicle stationary). (see Fig. 2b)
5. When "range" is selected, a value depending on the level in the tank is indicated (value between 0 and approx. 600 km). (See Fig. 3)
6. When "stopwatch" is selected, a time is indicated as of pressing the start button. (no illustration)
7. When "outside temperature" is selected, the actual outside temperature is indicated. (see Fig. 4).

If all these functions can be selected, the trip computer and keyboard are in proper working order.





## Functional check - Engine stopped -

Start button has been pressed.

### • Self-Check

Simultaneously press all 3 buttons of the keyboard.  
The functions appear at 1 sec. interval.

"Variant code"

"Display test"

"Vehicle electrical system voltage"

When the desired test function appears in the display, simultaneously release the 3 buttons.

### Display test:

The various segment blocks are automatically tested one after the other.

### Vehicle electrical system voltage:

The current vehicle electrical system voltage is indicated in volts without any unit of measure being given, with 2 decimal places after the point.

### Variant code = trip computer model:

A 3- or 4-digit number is output x.xxx.

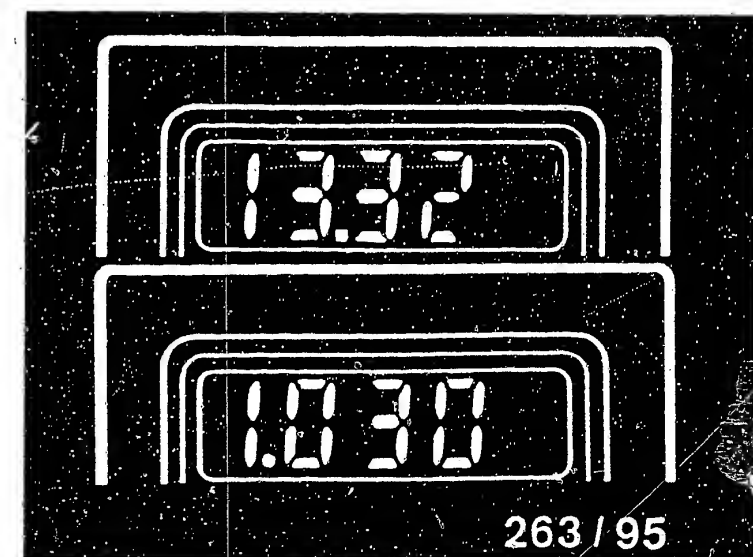
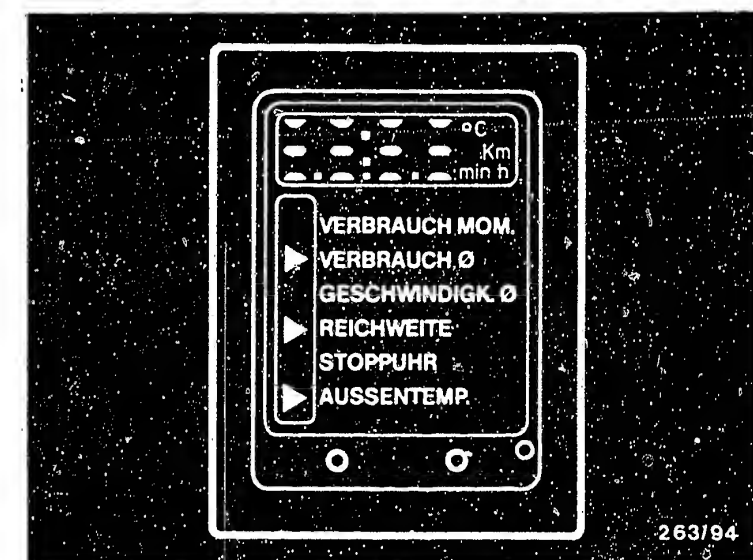
This contains the encoded features:

Senator/Monza

4/6 cylinder

2.5 / 3.0 bar

L / LE-Jetronic



**B11**

Trouble-shooting, functional test  
Opel trip computer



**B12**

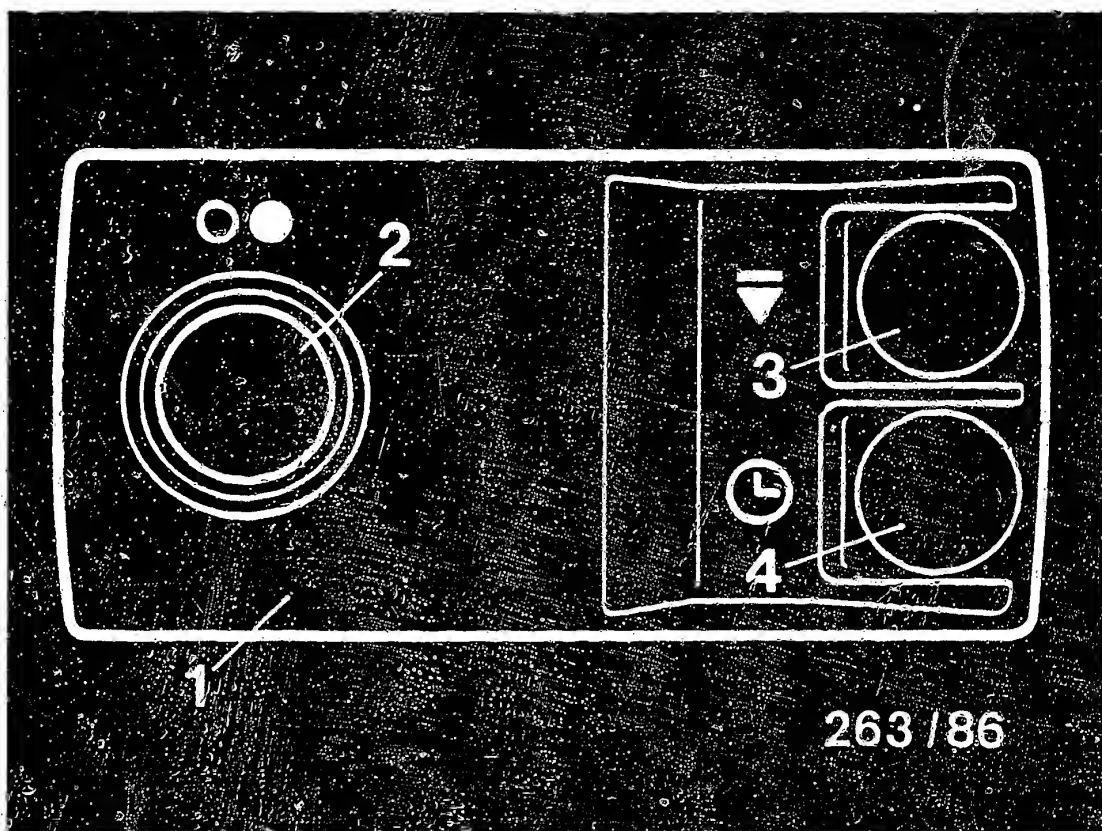
Trouble-shooting, functional test  
Opel trip computer



Plug No.	Model	Connect to plug 3	Encoding display
19	Jetronic L	yes	1
	LE2	no	0
18	No. of cylinders 4	yes	2
	6	no	0
17	Pressure 2.5 (bar)	yes	4
	3.0	no	0
Switch S M	Senator tank		8
	Monza tank		0
	Displacement code No.	Connect to plug 9	
8	2420	yes	512
10	2776	yes	1024

Example	Code
Senator	8
L-Jetronic	1
6-cyl.	0
3.0 pressure	0
Displacement code No. 2420	<u>512</u>
Encoding display	521





1 = Keyboard  
2 = Start button

3 = Function button  
4 = Priority button

End of test:

By pressing the function or priority button or "ignition" off.



Fault symptom (customer complaint)

1. No display on trip computer
2. Time of day incorrect
3. Time of day only - no other functions possible
4. No outside temperature display
5. Range - no display or display incorrect
6. Average speed - no display or display incorrect
7. Incomplete figures in display (segments only)
8. Figures in display only poorly visible
9. Slow disappearance of previous display when switching over (no contrast)
10. Consumption display incorrect
11. Illumination not working
12. Test function not working or showing incorrect values as of 6.84

											12. Test function not working or showing incorrect values as of 6.84	Testing Coordinates
											<u>Causes of trouble</u>	
●	●							●			No or temporarily no battery voltage to trip computer	D 17
●	●			●	●	●	●			●	Trip computer defective, replace	B 19
		●	●	●	●					●	No connection at Terminal 15 or no voltage present	D 21
		●		●	●			●		●	Keyboard defective, replace	A 21
			●								Connections or outside temperature sensor defective or damaged	E 3
				●							Tank sender defective, fuel tank dented, no voltage at tank sender	E 5
				●						●	Battery voltage too low, setting of range incorrect	D 17, B 23
				●	●						Tank sender defective	E 7
						●		●			Disconnect and connect trip computer with approx. 5 - 10 min break in between	---
										●	Bulb defective	B 19

Fault symptom (customer complaint)

1. No display on trip computer
2. Time of day incorrect
3. Time of day only - no other functions possible
4. No outside temperature display
5. Range - no display or display incorrect
6. Average speed - no display or display incorrect
7. Incomplete figures in display (segments only)
8. Figures in display only poorly visible
9. Slow disappearance of previous display when switching over (no contrast)
10. Consumption display incorrect
11. Illumination not working
12. Test function not working or showing incorrect values

### Causes of trouble

## Testing Coordinates

[illegible]

**B 17**

Trouble-shooting, trouble-shooting chart

Opel trip computer



B 18

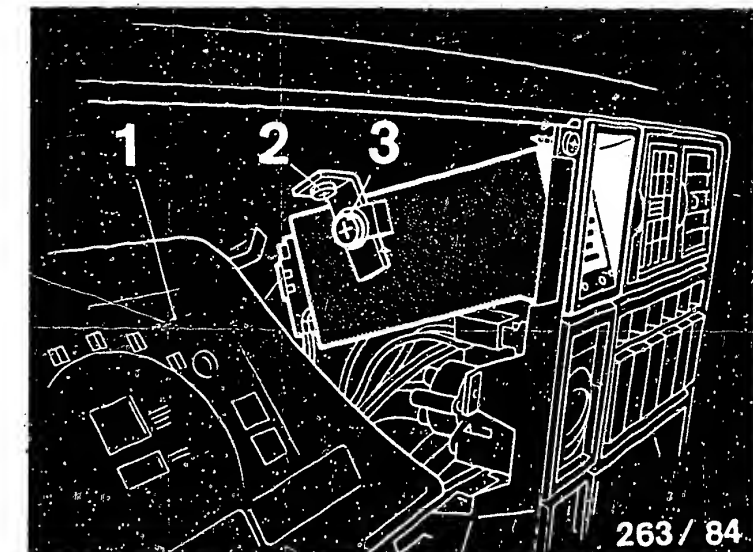
Trouble-shooting, trouble-shooting chart  
Opel trip computer



#### 6.4 Removing the trip computer

Remove 4 screws from speedometer panel (1) (2 screws at bottom are covered by plugs) and remove panel from above between steering wheel and windshield.

Remove screw (3) and remove trip computer from the front (see top picture)



- 1 = Screws on speedometer panel
- 2 = Bracket
- 3 = Hexagon screw

- a = Bayonet catch for illumination lamp
- b = Selector switch Senator/Monza

#### 6.5 Vehicle setting on trip computer

Switch at top: Setting for Senator

Switch at bottom: Setting for Monza (see bottom picture).

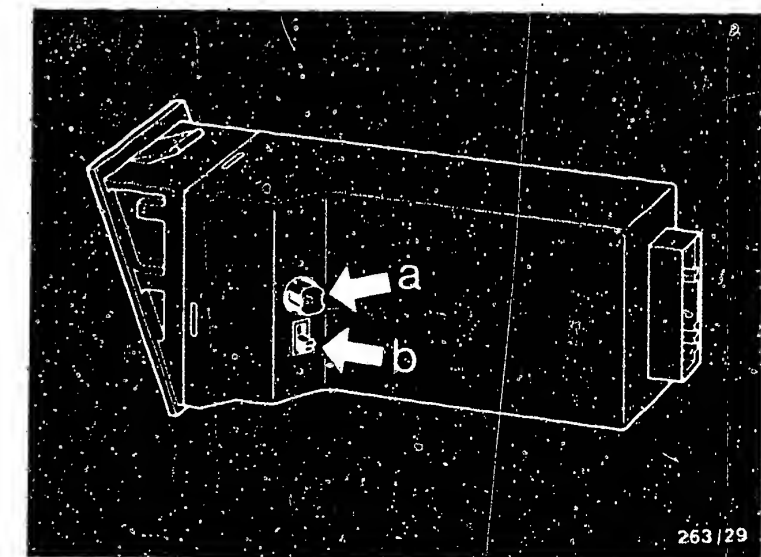
##### Note:

Both the different tank characteristics of Senator and Monza are stored in the trip computer.

The trip computer can be used for both vehicle models.

When installing, make sure that the selector switch is in the correct position.

If the trip computer has been replaced, it is necessary to readjust the time and the range.



**B 19**

Trouble-shooting, rem. of trip computer  
Opel trip computer



**B 20**

Trouble-shooting, rem. of trip computer  
Opel trip computer





## 6.6 Setting the time

Dots between hours and minutes flash:  
The clock is not set.

No operation:

Disconnect battery voltage from trip computer for 2 min and re-check function.

Setting the time:

Press the hour button (top illustration, arrow) (e.g. with ball point pen) and keep pressed until correct hour appears. Then release button. Dots between hours and minutes now flash.

Note: briefly pressing the buttons causes the respective display to advance by one unit.

Continuous pressing causes automatic advance by 5 units per second.

Press the minute button (center illustration, arrow) until the minute display is correct. Then release.

Note: the clock is not yet in operation.

Starting the clock:

Press the reset knob on the keyboard (bottom illustration, arrow). The clock is now started at zero seconds.

Dots between hours and minutes no longer flash.

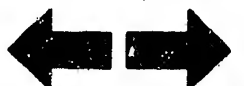
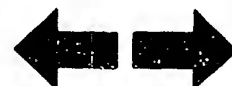
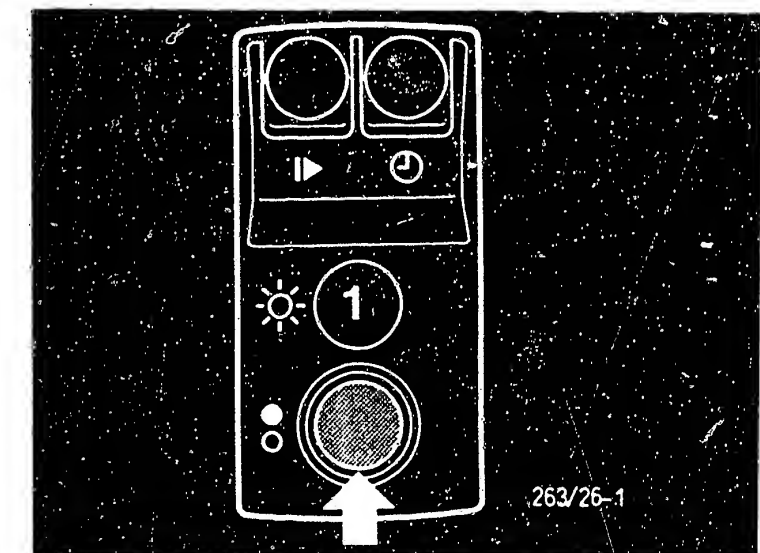
Clock is fast or slow:

Under extreme conditions an error of approx. 2 minutes per month is possible.

Reset the clock and check after 1 day.

If complaint is justified, complete trip computer must be replaced.

Important: In the illustration below, item 1 (illumination button) is only installed up to 6.84.



### 6.7 Setting the range

If the trip computer, tank sender or fuel tank has been replaced, it is necessary to re-adjust the trip computer.

1. Replace the positive connection to the electric fuel pump with a provisional lead. Remove the fuel hose from the fuel pump, attach a separate hose and introduce this hose into a fuel canister. Connect the provisional electric lead to the battery.  
- Fuel tank is emptied.
2. Pour precisely 15 l fuel into the fuel tank.
3. Switch on the ignition.  
Select function "calibrate range":  
Press function button and time button until all arrows come apart from the one for range. Release buttons together. Using a screwdriver (max. width of blade 1.5 mm, see illustration) set the range on the trip computer to 95 - 101 km (visible in display panel).

#### Note :

potentiometer has a turning angle of max. 270°.

Turn carefully.



**B23**

Trouble-shooting, setting the range  
Opel trip computer




**B24**

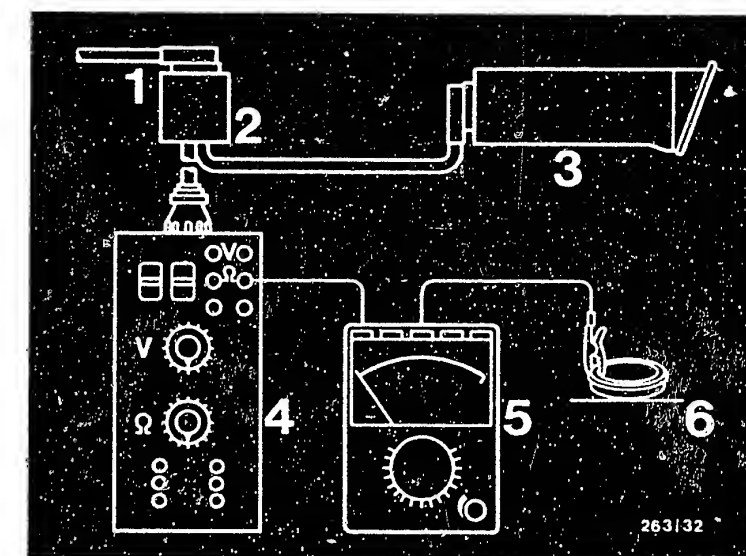
Trouble-shooting, setting the range  
Opel trip computer





## 6.8 Test with universal test adapter

Test step: 1			
Operation		Reading	Testing
Program switch "V" at position:		On multimeter:  0...10 Ω	Components: Lead from central ground to trip computer  Pin 2
Program switch "Ω" at position:			
Measuring equipment: Multimeter (Ω range)		If reading O.K., continue testing with <u>next test step</u> .	Operation: Resistance measurement Continuity
Measuring range: Ω x 1			
Connection: Test sockets blue			
Operation in vehicle: Plug of adapter lead attached to TC			
			Malfunction: Reading ∞ Ω



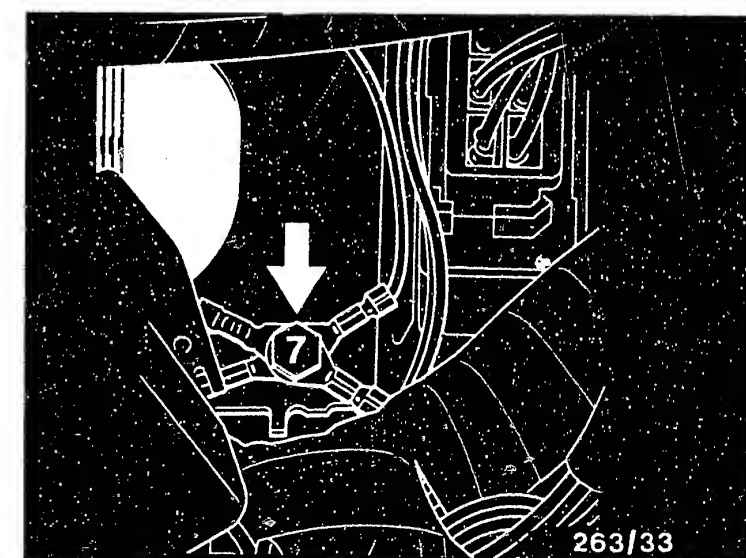
- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter
- 6 = Cigarette lighter

7 = Central ground

### Trouble-shooting:

Open circuit/contact resistance in lead from pin 2 on 26-pin plug on trip computer to central ground.

Eliminate open circuit/contact resistance.



**C1**

Test with universal test adapter  
Opel trip computer

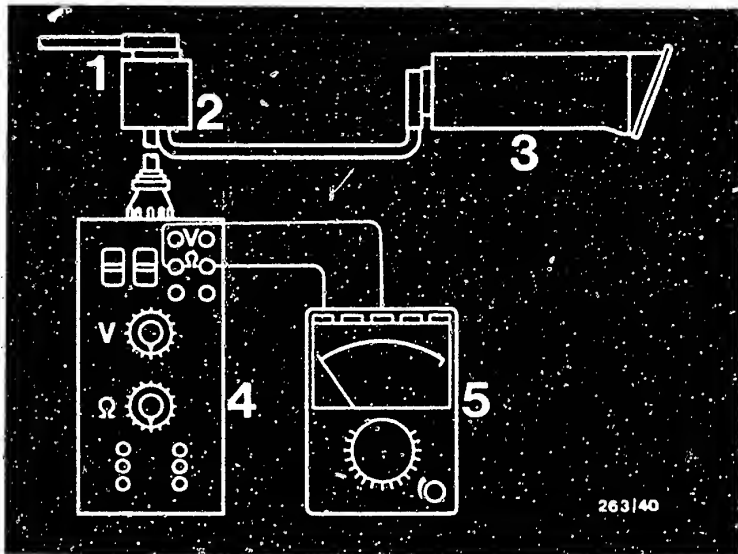


**C2**

Test with universal test adapter  
Opel trip computer



<u>Test step: 2</u>			
<u>Operation:</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Program switch "V" at position:</u>	↓	On multimeter  approx. 0... 10 Ω          If reading O.K., continue testing with next test step.	<u>Components:</u>  Ground lead from outside temperature sensor (D) to trip computer (A) Pin 12 and ground terminal within trip computer
<u>Program switch "Ω" at position:</u>	13		
<u>Measuring equipment:</u>  Multimeter ( Ω - range)			<u>Operation:</u>  Resistance measurement Continuity
<u>Measuring range:</u>  Ω x 1			
<u>Connection:</u>  Test sockets blue			<u>Malfunction:</u>  Reading ∞ Ω
<u>Operation in vehicle:</u>  Plug of adapter lead attached to TC			

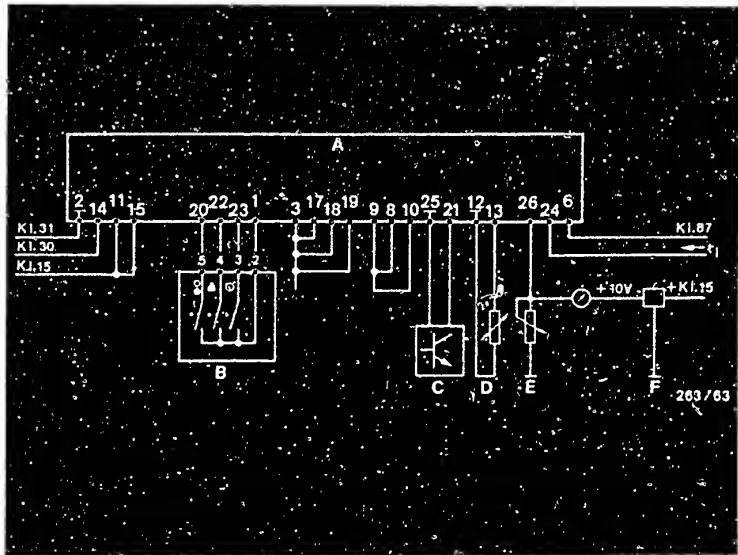



- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

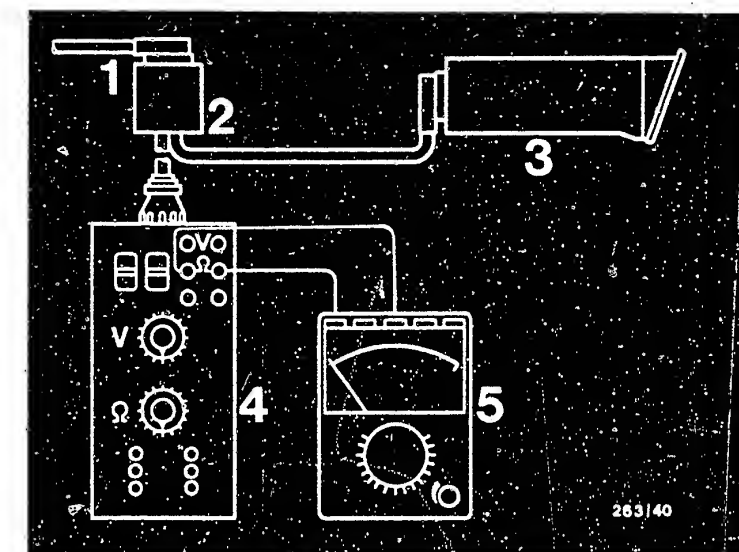
### Trouble-shooting:

Open circuit/contact resistance in lead from outside temperature sensor to trip computer pin 12 or within trip computer.

Eliminate open circuit/contact resistance.



<u>Test step: 3</u>			
<u>Operation:</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Program switch "V" at position:</u>		On multimeter approx. 0... 10 Ω	<u>Components:</u> Ground lead from displacement sensor (C) to trip computer (A) Pin 25 and ground terminal within trip computer
<u>Program switch "Ω " at position:</u>	14		
<u>Measuring equipment:</u> Multimeter ( Ω - range)		If reading O.K., con- tinue testing with next <u>test step</u> .	<u>Operation:</u> Resistance measurement Continuity
<u>Measuring range:</u> Ω x 1			
<u>Connection:</u> Test sockets blue			
<u>Operation in vehicle:</u> Plug of adapter lead attached to TC			
		<u>Malfunction:</u> Reading ∞ Ω	

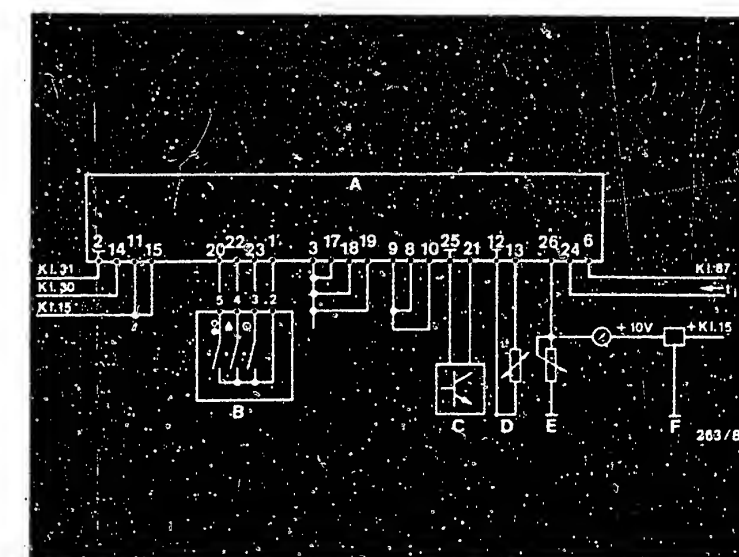


- 1 = 26-pin plug on vehicle wiring harness  
2 = Adapter lead  
3 = Trip computer  
4 = Universal test adapter  
5 = Multimeter

#### Trouble-shooting:

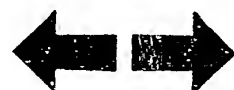
Open circuit/contact resistance in lead from displacement sensor to trip computer pin 25 or within trip computer.

Eliminate open circuit/contact resistance.



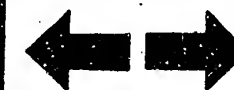
**C5**


Test with universal test adapter  
Opel trip computer

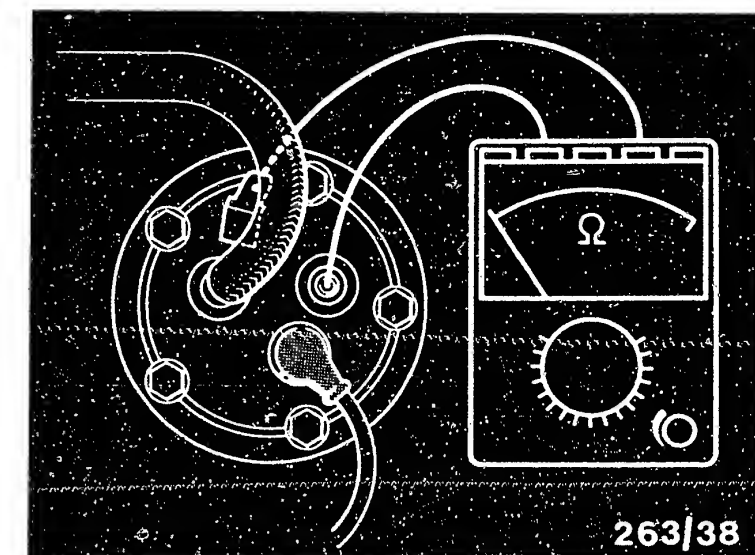


**C6**

Test with universal test adapter  
Opel trip computer



<u>Test step: 4</u>			
<u>Operation:</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Program switch "V" at position:</u>		On multimeter:  approx. 30 ... 290 Ω	<u>Component:</u> Tank sender Internal resistance
<u>Program switch "Ω" at position:</u>	15		
<u>Measuring equipment:</u> Multimeter (Ω range)		If reading O.K., con- tinue testing with <u>next test step.</u>	<u>Operation:</u> Resistance measurement
<u>Measuring range:</u> Ω x 1			
<u>Connection:</u> Test sockets blue			
<u>Operation in vehicle:</u> Tank plug removed Plug of adapter lead attached to TC			<u>Malfunction:</u> Reading ∞ Ω



### Trouble-shooting:

Tank sender defective - replace.

### Note:

After replacing the tank sender, it is necessary to readjust the range on the trip computer.

Continued on C9/C10

**C7**

Test with universal test adapter  
Opel trip computer



**C8**

Test with universal test adapter  
Opel trip computer



### Adjusting the range

1. Replace the positive connection on the electric fuel pump by a provisional lead.

Remove fuel hose from fuel pump, plug on separate hose and introduce this hose into a fuel canister.

Connect provisional electric lead to battery.

- Fuel tank is emptied.

2. Fill precisely 15 liters of fuel into fuel tank.

3. Switch on the ignition.

Select function "calibrate range":

Press function button and time button until all arrows come apart from the one for range. Release buttons together. Using a screwdriver (max. width of blade 1.5 mm, see illustration) set the range on the trip computer to 95 - 101 km (visible in display panel).



### Note :

potentiometer has a turning angle of max. 270°.

Turn carefully.

**C9**


Test with universal test adapter  
Opel trip computer

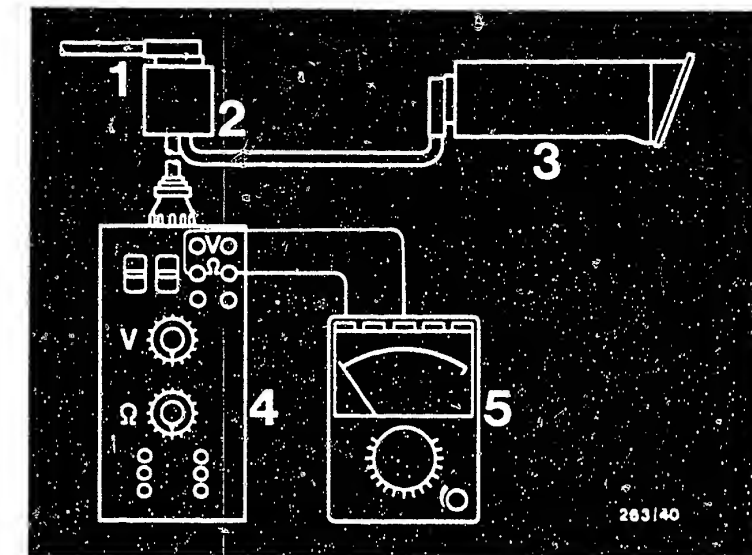


**C10**

Test with universal test adapter  
Opel trip computer



Test step 5			
Operation:		Reading:	Testing:
<u>Program switch "V"</u> at position:		On multimeter:  approx. 0 ... 10 Ω	<u>Component:</u> Encoding lead 2
<u>Program switch "Ω"</u> at position:	16		
<u>Measuring equipment:</u> Multimeter (Ω range)		If reading O.K., con- tinue testing with <u>next test step.</u>	<u>Operation:</u> Resistance measurement from pin 17 → 3
<u>Measuring range:</u> Ω x 1			
<u>Connection:</u> Test sockets blue			<u>Malfunction:</u> Reading ∞ Ω
<u>Operation in vehicle:</u> Plug of adapter lead attached to TC			

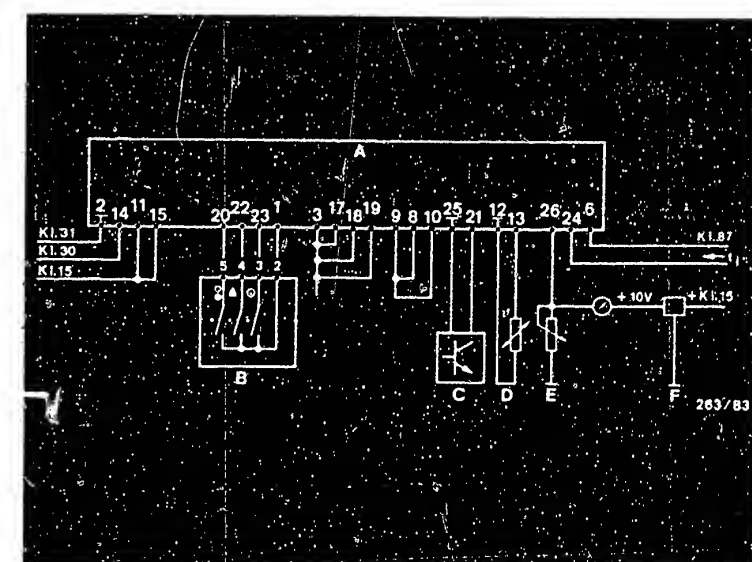


- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

### Trouble-shooting:

Break/contact resistance in lead between pin 17 on 26-pin plug on trip computer and pin 3.

Eliminate open circuit/contact resistance.



**C11**

Test with universal test adapter  
Opel trip computer



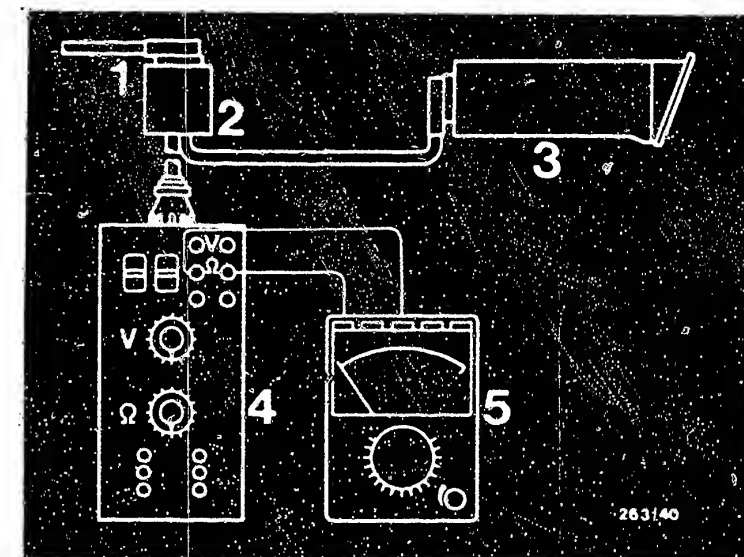
**C12**

Test with universal test adapter  
Opel trip computer





Test step 6			
Operation:		Reading:	Testing:
Program switch "V" at position:	↓	On multimeter: approx. 0 ... 10 $\Omega$	<u>Component:</u> Encoding lead 3
Program switch " $\Omega$ " at position:	17		
Measuring equipment:			
Multimeter ( $\Omega$ range)		If reading O.K., continue testing with next test step	<u>Operation:</u> Resistance measurement from pin 18 → 3
Measuring range:	$\Omega \times 1$		
Connection:	Test sockets blue		
Operation in vehicle:	Plug of adapter lead attached to TC		<u>Malfunction:</u> Reading $\infty \Omega$

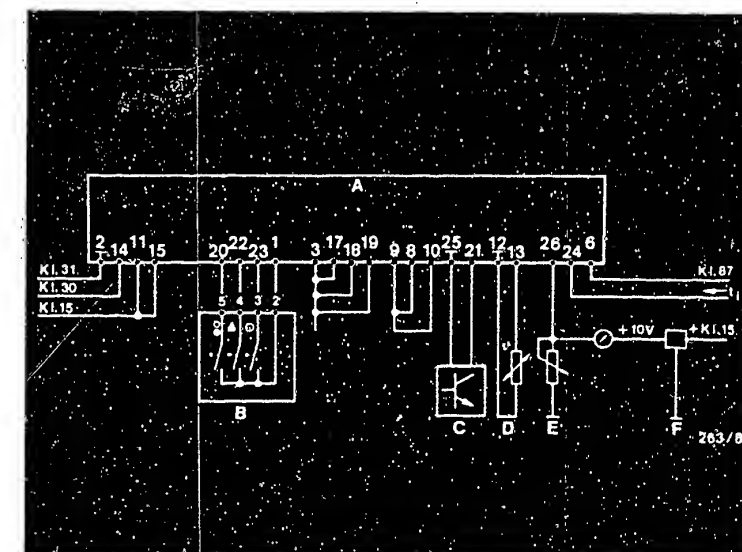


- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

### Trouble-shooting:

Break/contact resistance in lead between pin 18 on 26-pin plug on trip computer and pin 3.

Eliminate open circuit/contact resistance.



**C13**

Test with universal test adapter  
Opel trip computer

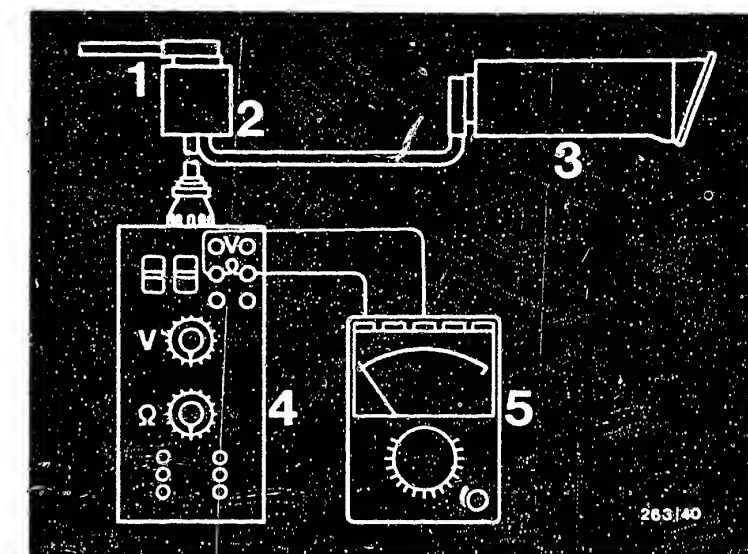


**C14**

Test with universal test adapter  
Opel trip computer



Test step 7		
Operation:		Reading:
Program switch "V" at position:	↓	On multimeter: approx. 0 ... 10 $\Omega$
Program switch " $\Omega$ " at position:	18	
Measuring equipment:		
Multimeter ( $\Omega$ range)		If reading O.K., continue testing with next test step.
Measuring range:	$\Omega \times 1$	
Connection:	Test sockets blue	
Operation in vehicle:	Plug of adapter lead attached to TC	
Testing:		Component:
		Encoding lead 4
		Operation:
		Resistance measurement from pin 19 $\rightarrow$ 3
		Malfunction:
		Reading $\infty \Omega$

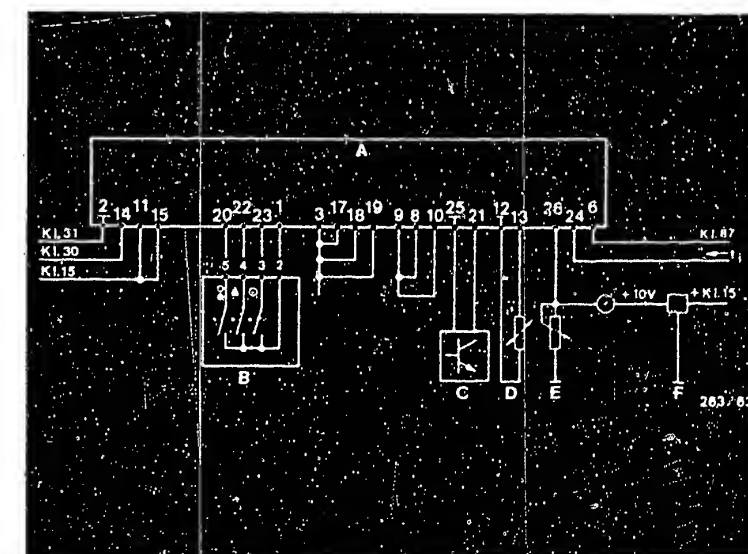


- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

### Trouble-shooting:

Break/contact resistance in lead between pin 19 on 26-pin plug on trip computer and pin 3.

Eliminate open circuit/contact resistance.



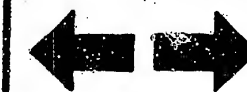
**C15**

Test with universal test adapter  
Opel trip computer




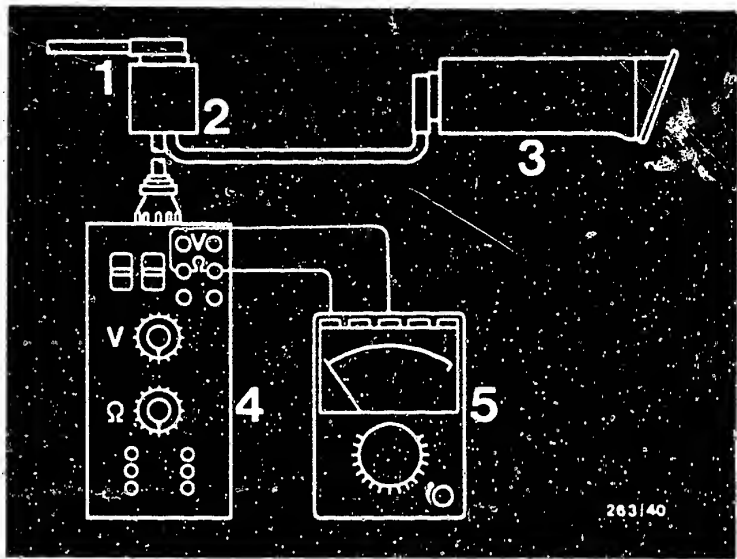
**C16**

Test with universal test adapter  
Opel trip computer





Test step 8			
Operation:		Reading:	Testing:
<u>Program switch "V" at position:</u>		On multimeter:  approx. 0 ... 10 Ω  	

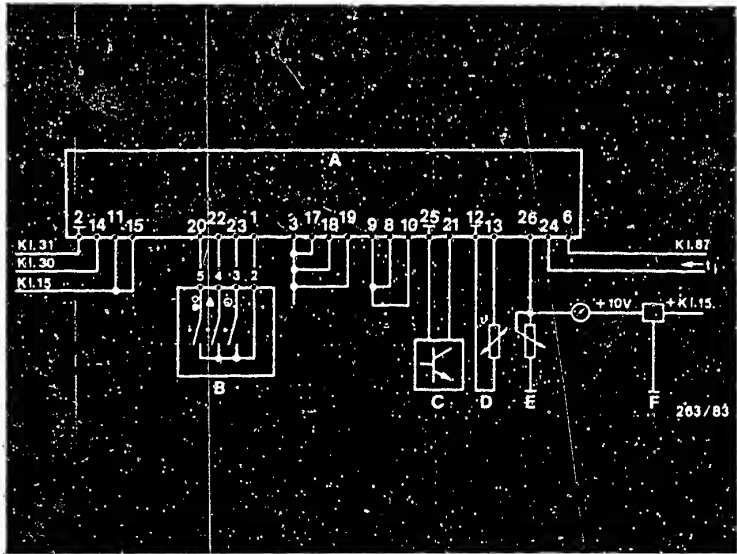


- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

#### Trouble-shooting:

Break/contact resistance in lead between pin 8 on 26-pin plug on trip computer and pin 9.

Eliminate open circuit/contact resistance.



**C17**

Test with universal test adapter  
Opel trip computer

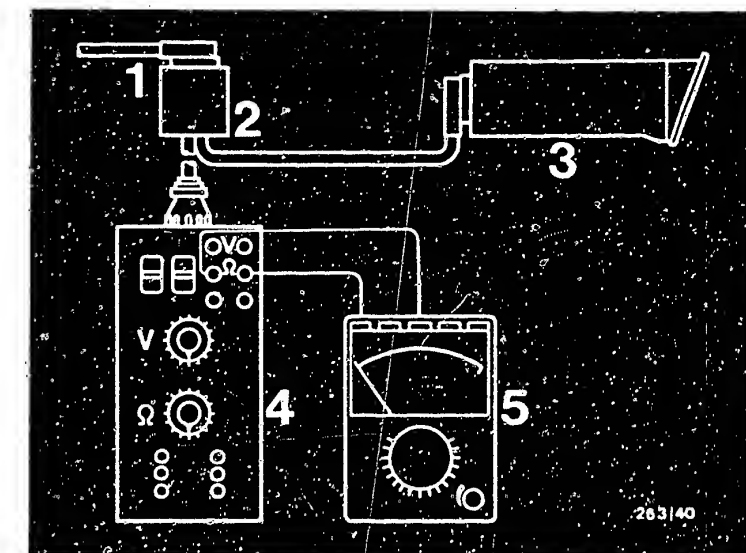


**C18**

Test with universal test adapter  
Opel trip computer



<u>Test step 9</u>			
<u>Operation:</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Program switch "V"</u> <u>at position:</u>	↓	On multimeter:  approx. 0 ... 10 Ω	<u>Component:</u>  Encoding lead 6
<u>Program switch "Ω "</u> <u>at position::</u>	21		
<u>Measuring equipment:</u> Multimeter (Ω range)			If reading O.K., con- tinue testing with next test step.
<u>Measuring range:</u> Ω x 1			
<u>Connection:</u> Test sockets blue		<u>Malfunction:</u>  Reading ∞ Ω	
<u>Operation in vehicle:</u> Plug of adapter lead attached to TC			

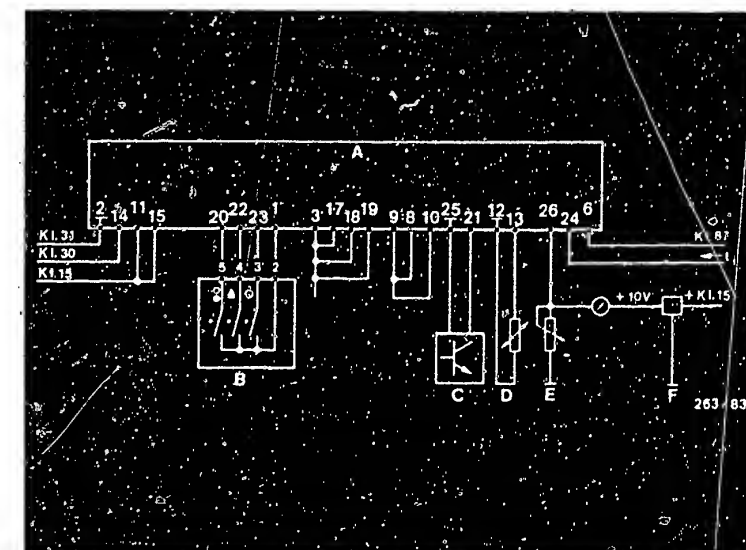


- 1 = 26-pin plug on vehicle wiring harness  
2 = Adapter lead  
3 = Trip computer  
4 = Universal test adapter  
5 = Multimeter

#### Trouble-shooting:

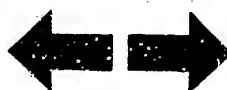
Open circuit/contact resistance in lead from pin 10 on 26-pin plug on trip computer to central ground.

Eliminate open circuit/contact resistance.



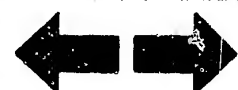
**C19**

Test with universal test adapter  
Opel trip computer

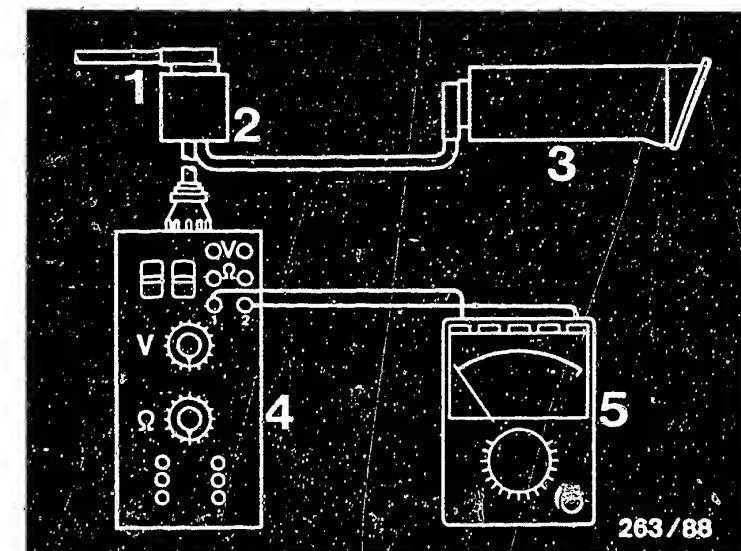


**C20**

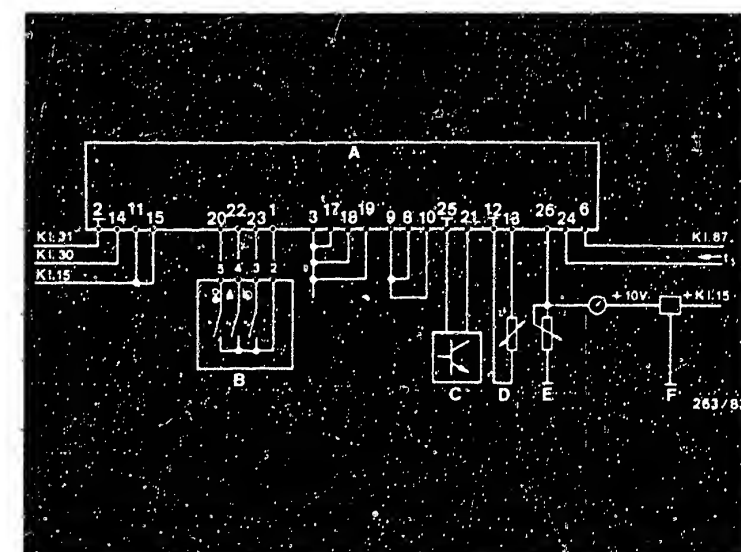
Test with universal test adapter  
Opel trip computer



<u>Test step 10</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Operation:</u>		On multimeter  approx. 0 ... 10 Ω	<u>Component:</u>  Keyboard and lead to trip computer
<u>Program switch "V" at position:</u>	--		
<u>Program switch "Ω" at position:</u>	--		
<u>Measuring equipment:</u> Multimeter (Ω range)			<u>Operation:</u> Resistance measurement from pin 23 → 1
<u>Measuring range:</u> Ω x 1			<u>Malfunction:</u> Reading ∞Ω
<u>Connection:</u> Test sockets 1 + 2			
<u>Operation in vehicle:</u> Plug of adapter lead attached to TC			
<u>Additional operation:</u> On keyboard, press button for time of day.			



- 1=26-pin plug on vehicle wiring harness  
2=Adapter lead  
3=Trip computer  
4=Universal test adapter  
5=Multimeter



#### Possible faults:

Break/contact resistance in plug-in connection in wiring harness between keyboard pin 3 and pin 23.

Keyboard defective.

Eliminate break / contact resistance.

Defective keyboard.

Continued on C23/C24

**C21**

Test with universal test adapter  
Opel trip computer



**C22**

Test with universal test adapter  
Opel trip computer

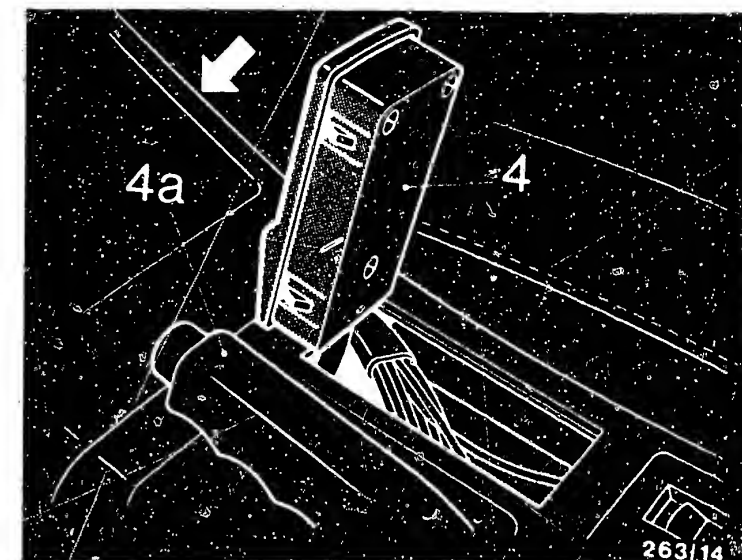


Removing the operator keyboard (continuation of test step 10)

To remove the operator keyboard, unscrew the center console and pull slightly to the rear.

Undo the plug-in connection between operator keyboard and wiring harness at the front right behind the center console (arrow, right-hand picture).

Using a screwdriver, carefully raise the operator keyboard and remove (see right-hand picture).



4 = Operator keyboard  
4a= Handbrake

**C23**

Test with universal test adapter  
Opel trip computer

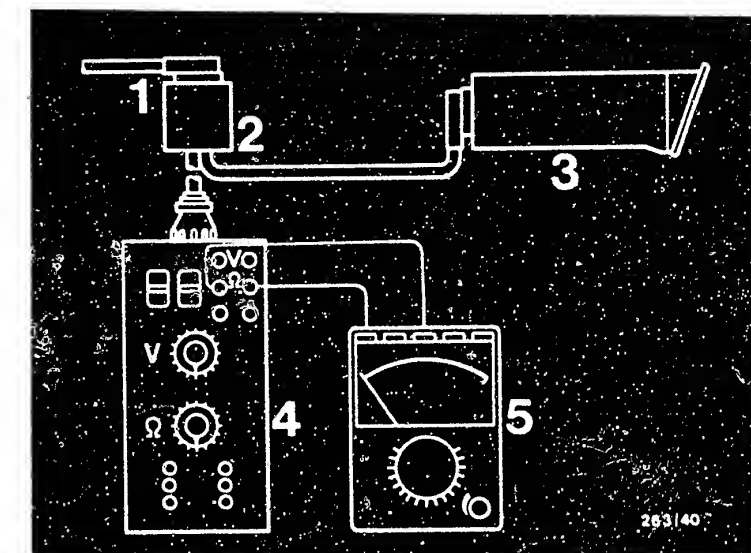


**C24**

Test with universal test adapter  
Opel trip computer



Test step 11			
Operation:		Reading:	Testing:
<u>Program switch "V" at position:</u>	↓	On multimeter  0 ... 10 Ω          If reading O.K., con- tinue testing with <u>next test step.</u>	<u>Component:</u> Operator keyboard and lead to trip computer
<u>Program switch "Ω" at position:</u>	10		
<u>Measuring equipment:</u> Multimeter (Ω range )			<u>Operation:</u> Resistance measurement from pin 22 → 1
<u>Measuring range:</u> 0 ... 10 Ω			<u>Malfunction:</u> Reading ∞ Ω
<u>Connection:</u> Test socket blue			
<u>Operation in vehicle:</u> Plug of adapter lead attached to TC			
<u>Additional operation:</u> On operator keyboard operate function button  ▶			



- 1 = 26-pin plug on vehicle wiring harness  
 2 = Adapter lead  
 3 = Trip computer  
 4 = Universal test adapter  
 5 = Multimeter

#### Trouble-shooting:

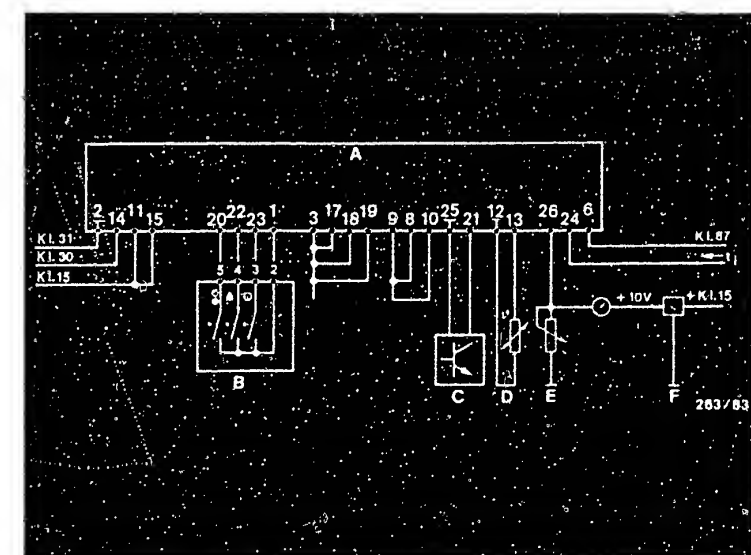
Open circuit/contact resistance in plug connection in wiring harness between operator keyboard pin 4 and trip computer pin 22.

Operator keyboard defective.

Eliminate open circuit/contact resistance.

Replace defective operator keyboard.

Continued on D3/D4



**D1**

Test with universal test adapter  
Opel trip computer



**D2**

Test with universal test adapter  
Opel trip computer

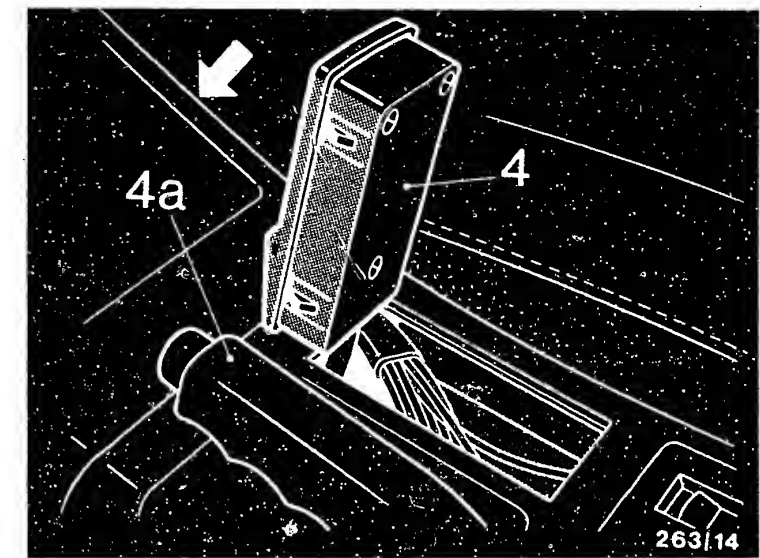


Removing the operator keyboard (continuation of test step 11)

To remove the operator keyboard, unscrew the center console and pull slightly to the rear.

Undo the plug-in connection between operator keyboard and wiring harness at the front right behind the center console (arrow, right-hand picture).

Using a screwdriver, carefully raise the operator keyboard and remove (see right-hand picture).



4 = Operator keyboard  
4a= Handbrake

**D3**

Test with universal test adapter  
Opel trip computer



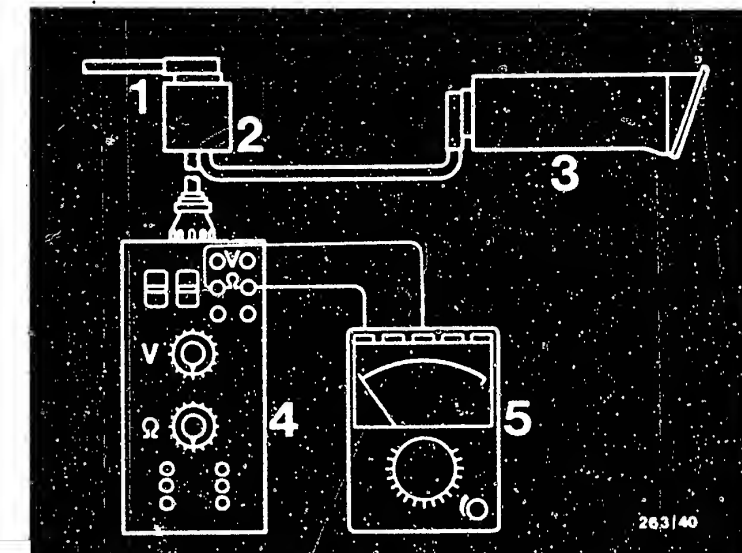
**D4**

Test with universal test adapter  
Opel trip computer





Test step 12			
Operation:		Reading:	Testing:
Program switch "V" at position:	↓	On multimeter::  approx. 0 ... 10 $\Omega$       If reading O.K., continue testing with next test step.	Component: Operator keyboard and lead to trip computer
Program switch " $\Omega$ " at position:	9		
Measuring equipment: Multimeter ( $\Omega$ range)			Operation: Resistance measurement from pin 20 → 1
Measuring range: x 1 $\Omega$			Malfunction: Reading $\infty \Omega$
Connection: Test socket blue			
Operation in vehicle: Plug of adapter lead attached to TC			
Additional operation: On operator keyboard press start button	● ○		



- 1 = 26-pin plug on vehicle wiring harness  
2 = Adapter lead KDES 0003  
3 = Trip computer  
4 = Universal test adapter  
5 = Multimeter

### Trouble-shooting:

Open circuit/contact resistance in plug connection in wiring harness between operator keyboard pin 5 and trip computer pin 20.

Operator keyboard defective.

Eliminate open circuit/contact resistance.

Replace defective operator keyboard.

Continued on D7/D8

**D5**

Test with universal test adapter  
Opel trip computer



**D6**

Test with universal test adapter  
Opel trip computer

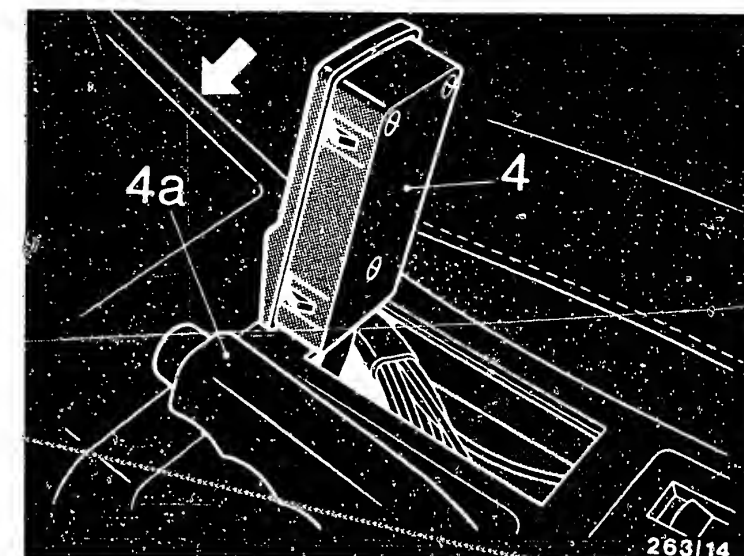


Removing the operator keyboard (continuation of test step 12)

To remove the operator keyboard, unscrew the center console and pull slightly to the rear.

Undo the plug-in connection between operator keyboard and wiring harness at the front right behind the center console (arrow, right-hand picture).

Using a screwdriver, carefully raise the operator keyboard and remove (see right-hand picture).



4 = Operator keyboard  
4a= Handbrake

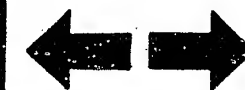
**D7**

Test with universal test adapter  
Opel trip computer



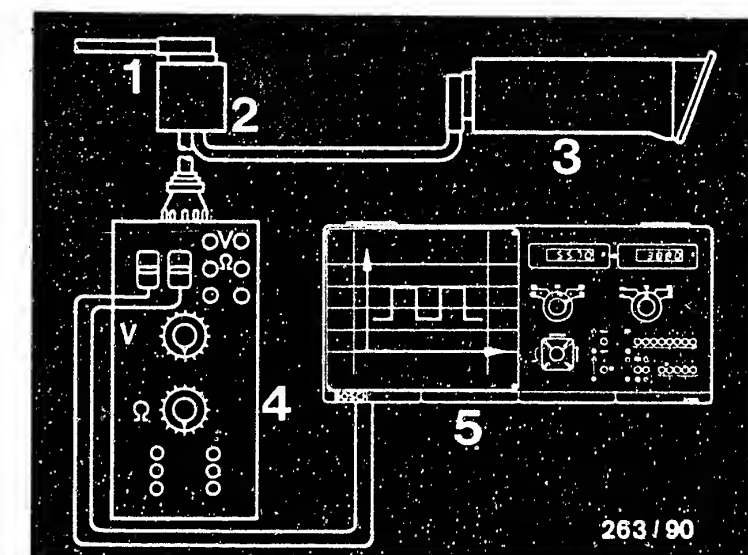
**D8**

Test with universal test adapter  
Opel trip computer





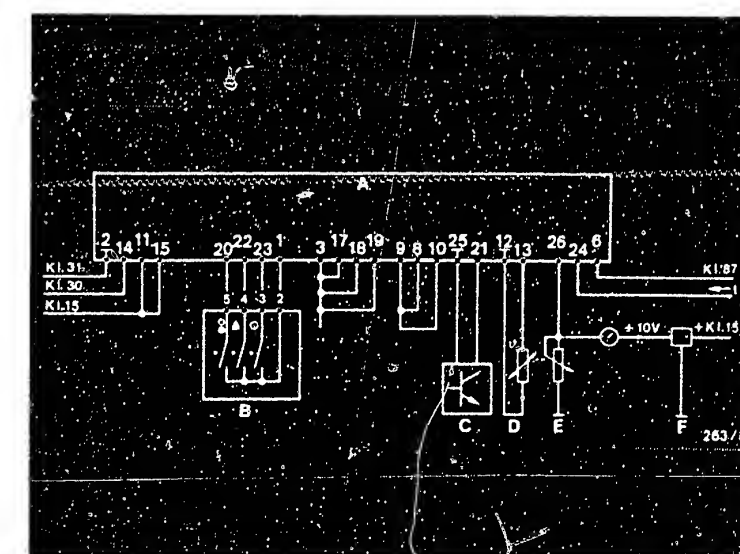
<u>Test step 13</u>			
<u>Operation:</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Program switch "V" at position:</u>	3	On oscilloscope of motortester:  oscilloscope pattern similar to the one shown (see pattern at top in motortester).	<u>Component:</u> Lead from keyboard (B) pin 2 to trip computer (A)
<u>Program switch "Ω" at position:</u>	-		
<u>Measuring equipment:</u> Oscilloscope e.g. MOT 201			
<u>Measuring range:</u> ----			<u>Operation:</u> See on oscilloscope whether pulsed voltage can be seen.
<u>Connection:</u> Test wells on universal test adapter		If reading O.K., continue testing with <u>next test step.</u>	<u>Malfunction:</u> No rectangular signal.
<u>Operation in vehicle:</u> Ignition ON Plug of adapter lead attached to TC			



- 1=26-pin plug on vehicle wiring harness  
2=Adapter lead KDES 0003  
3=Trip computer  
4=Universal test adapter  
5=Motortester with oscilloscope

#### Possible faults:

Break / contact resistance in lead between keyboard pin 2 and trip computer pin 1.  
Trip computer defective.  
Eliminate break / contact resistance.



**D9**

Test with universal test adapter  
Opel trip computer

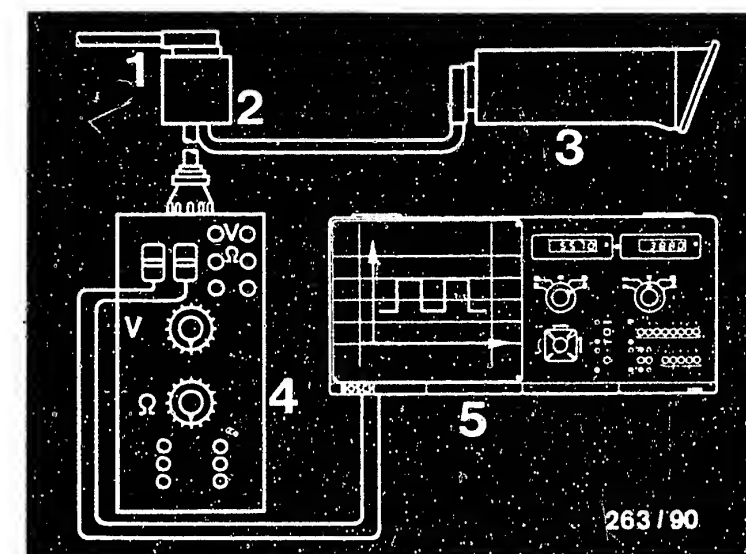


**D10**

Test with universal test adapter  
Opel trip computer



<u>Test step 14</u>			
<u>Operation:</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Program switch "V" at position:</u>	4	On oscilloscope of motortester:  oscilloscope pattern similar to the one shown (see pattern at top in motortester).  <	

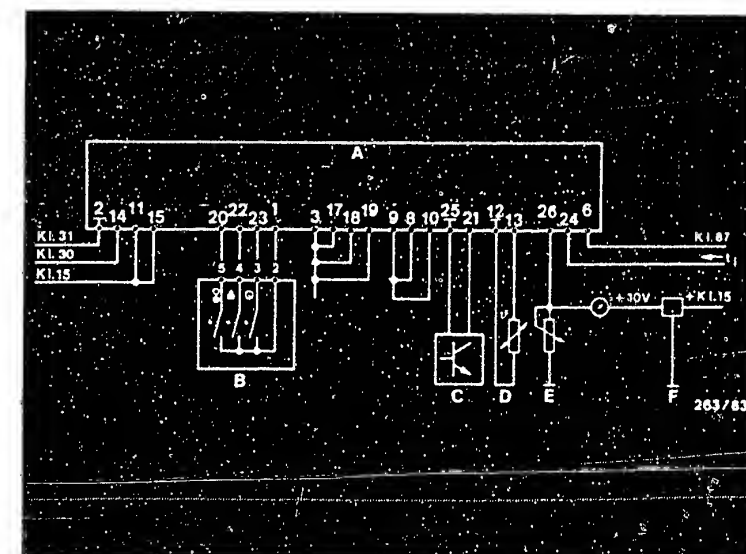


- 1=26-pin plug on vehicle wiring harness  
2=Adapter lead KDES 0003  
3=Trip computer  
4=Universal test adapter  
5=Motortester with oscilloscope

#### Possible faults:

Break / contact resistance in lead between pin 3 on 26-pin plug and trip computer.

Eliminate break / contact resistance.



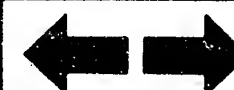
**D11**

Test with universal test adapter  
Opel trip computer

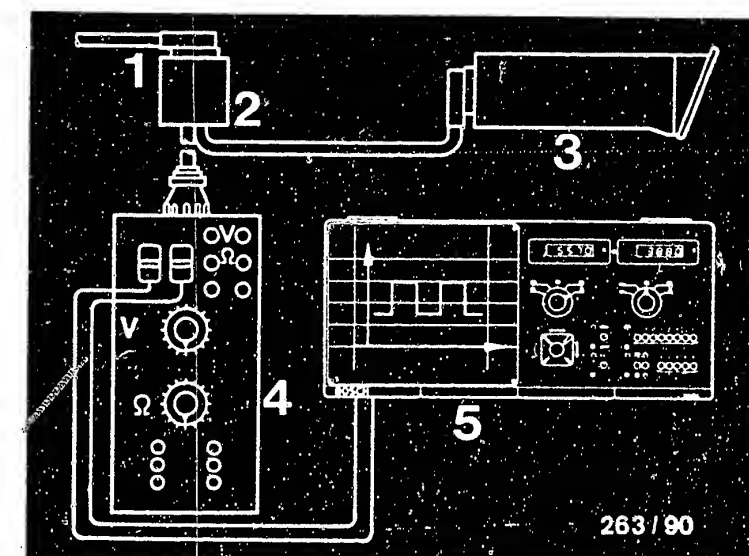


**D12**

Test with universal test adapter  
Opel trip computer



Test step 15			
Operation:		Reading:	Testing:
<u>Program switch "V"</u> <u>at position:</u>	7	On oscilloscope of motortester:  oscilloscope pattern similar to the one shown (see pattern at top in motortester).  <	

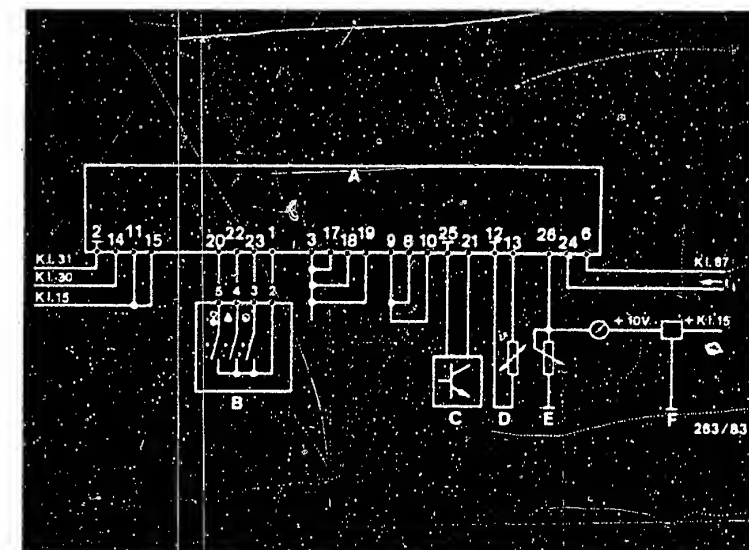


- 1=26-pin plug on vehicle wiring harness  
2=Adapter lead KDES 0003  
3=Trip computer  
4=Universal test adapter  
5=Motortester with oscilloscope

#### Possible faults:

Break / contact resistance in lead between pin 9 on 26-pin plug and trip computer.

Eliminate break / contact resistance.



**D 13**

Test with universal test adapter  
Opel trip computer

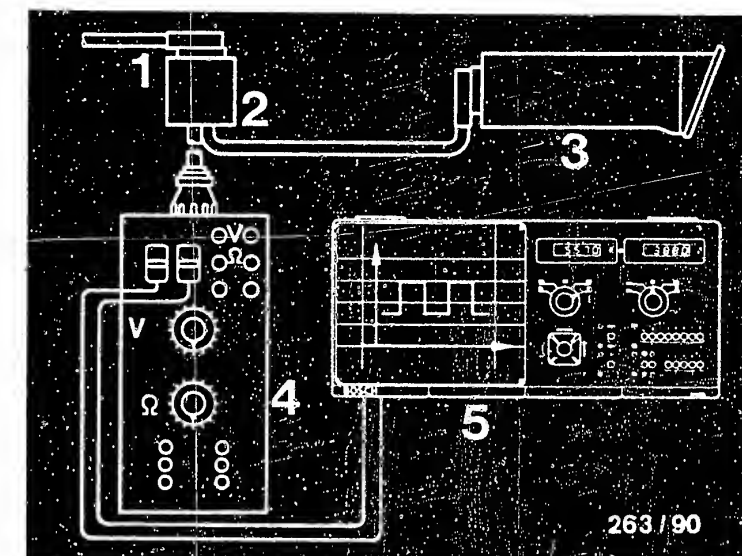


**D 14**

Test with universal test adapter  
Opel trip computer

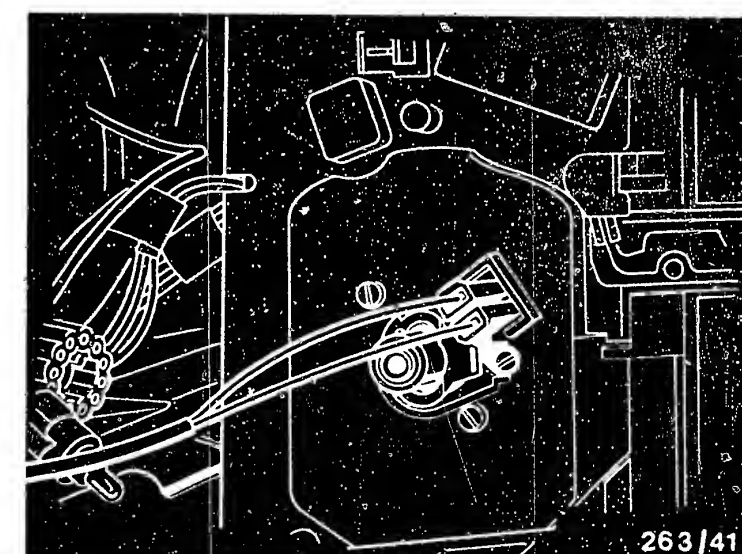


Test step 16			
Operation:		Reading:	Testing:
<u>Program switch "V"</u> <u>at position:</u>	8	On oscilloscope of motortester:	<u>Component:</u> Displacement pickup
<u>Program switch "Ω"</u> <u>at position:</u>	-	oscilloscope pattern similar to the one shown (see pattern at top in motortester).	
<u>Measuring equipment:</u> e.g. Motortester MOT 201		ind. ampl. 1- 2 V opt. U1 ≤ 0.5 V U2 ≥ 6 V	<u>Operation:</u> See on oscilloscope whether signal from optical pickup shows a pulsed rectangular voltage (see top photo) and from inductive pickup a sinusoidal voltage.
<u>Measuring range:</u> ----			
<u>Connection:</u> Test wells on universal test adapter		If reading O.K., continue testing with <u>next test step.</u>	<u>Malfunction:</u> Signal not identical with the one shown.
<u>Operation in vehicle</u> Engine running and drive wheels turning Plug of adapter lead attached to TC			



- 1=26-pin plug on vehicle wiring harness  
2=Adapter lead KDES 0003  
3=Trip computer  
4=Universal test adapter  
5=Motortester with oscilloscope

Back of speedometer



#### Possible faults:

Break / contact resistance in lead between displacement pickup and trip computer pin 21.

Displacement pickup defective (if km display functioning).  
If installed, Opel cruise control defective.

Eliminate break / contact resistance.

Replace displacement pickup.

**D 15**

Test with universal test adapter  
Opel trip computer



**D 16**

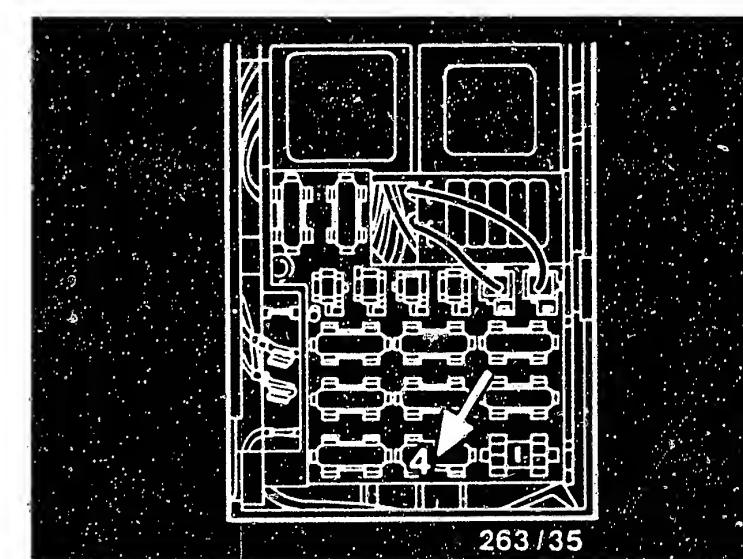
Test with universal test adapter  
Opel trip computer



# Test step 17

<u>Operation:</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Program switch "V" at position:</u>	9	On multimeter:  $U_{Batt} \geq 12 \text{ V}$   <	

- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead KDES 0003
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter



## Possible faults:

- Break / contact resistance in lead between Term. 30 and trip computer pin 14.
- Fuse No. 4 defective (see arrow in bottom picture).
- Battery insufficiently charged.
- Eliminate break / contact resistance.
- Replace defective fuse.
- If fault eliminated, re-set time of day.

Continued on D19/D20

D17

Test with universal test adapter  
Opel trip computer

←

→

D18

Test with universal test adapter  
Opel trip computer

←

→



## Setting the time (continuation of test step 17)

Dots between hours and minutes flash:

Setting the hours:

Press hours button (top picture, arrow) (e.g. with ball-point pen) and hold in this position until the hours display is correct. Then release button.

Dots between hours and minutes now flash.

### Note:

Brief depressing of the adjustment buttons causes the respective display to move on by one unit.

Continuous pressing causes automatic advance by 5 units per second.

Press the minutes button (center picture, arrow) until the minutes display is correct.

Then release button.

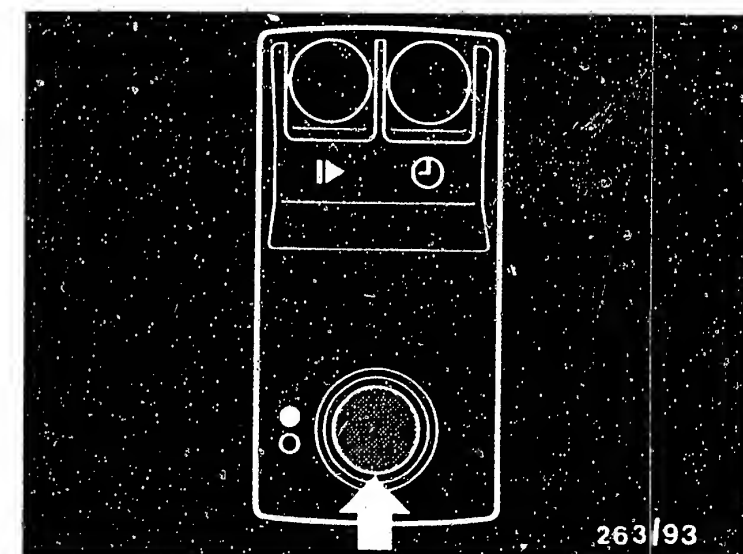
### Note:

The clock is not yet running.

Starting the clock:

Press the reset knob on the operator keyboard (bottom picture, arrow). The seconds are set to zero and the clock is started.

Dots between hours and minutes no longer flash.



**D 19**

Test with universal test adapter  
Opel trip computer

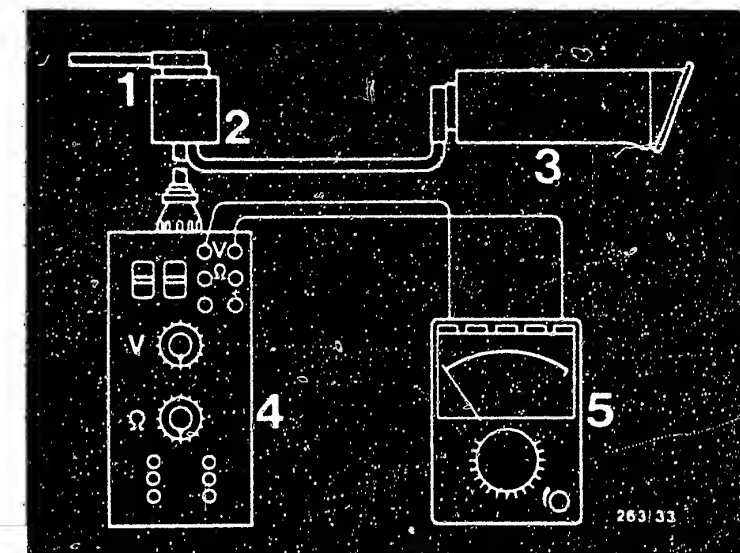


**D 20**

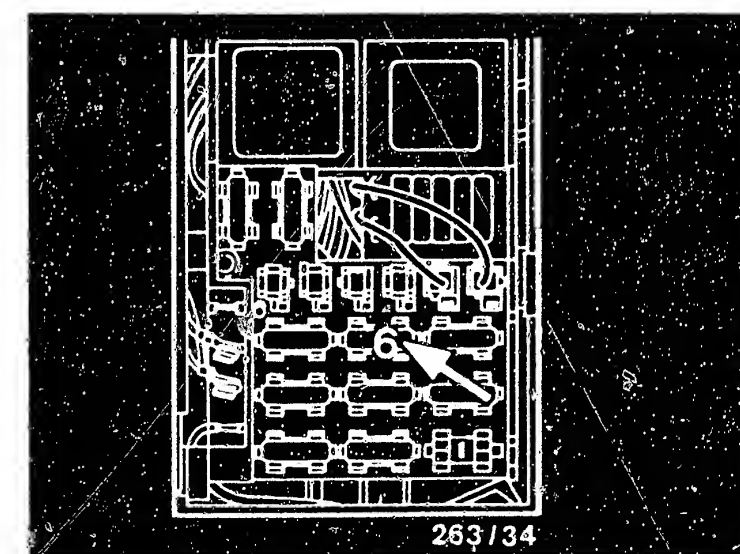
Test with universal test adapter  
Opel trip computer



Test step 18			
Operation:		Reading:	Testing:
<u>Program switch "V"</u> <u>at position:</u>	10	On multimeter:  $U_{\text{Batt}} \geq 12 \text{ V}$	<u>Component:</u>  Power supply to trip computer through ignition lock.
<u>Program switch "Ω"</u> <u>at position:</u>	-		
<u>Measuring equipment:</u>  Multimeter (V range)			<u>Operation:</u>  Voltage measurement Continuity
<u>Measuring range:</u>  0 ... 15 V		<u>Malfunction:</u>  No voltage after "ignition ON" > battery voltage	
<u>Connection:</u>  Test sockets red    = positive black = negative			
<u>Operation in vehicle:</u> Ignition ON Plug of adapter lead attached to TC			



- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead KDES 0003
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter



### Trouble-shooting:

Open circuit/contact resistance in lead from ignition lock term. 15 to trip computer pin 11.

Fuse no. 6 defective (see bottom picture).

Eliminate open circuit/contact resistance.

Replace defective fuse.

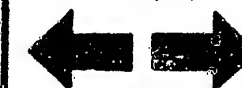
**D21**

Test with universal test adapter  
Opel trip computer



**D22**

Test with universal test adapter  
Opel trip computer



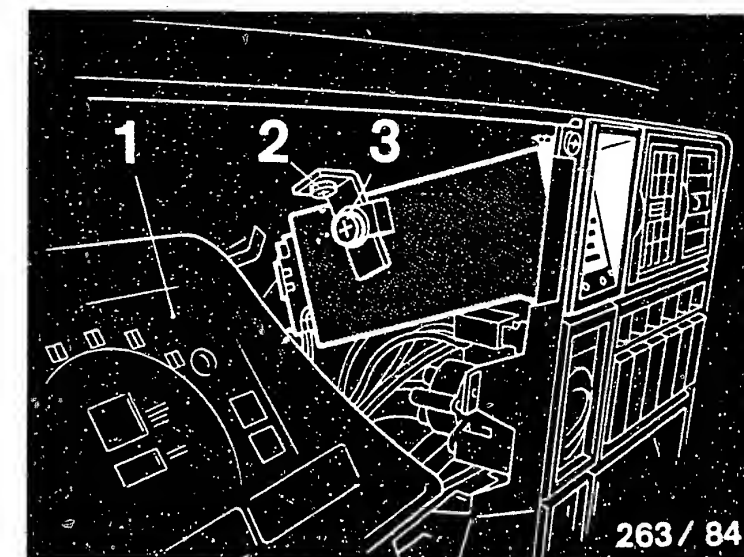




Removing the trip computer (continued from test step 19)

Remove 4 screws from speedometer panel (1) (2 screws at bottom are covered by plugs) and remove panel from above between steering wheel and windshield.

Remove screw (3) and bracket (2) and withdraw trip computer from front (see picture).



- 1 = Screws on speedometer panel
- 2 = Bracket
- 3 = Hexagon screw

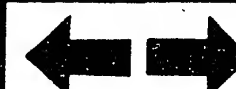
**E1**

Test with universal test adapter  
Opel trip computer

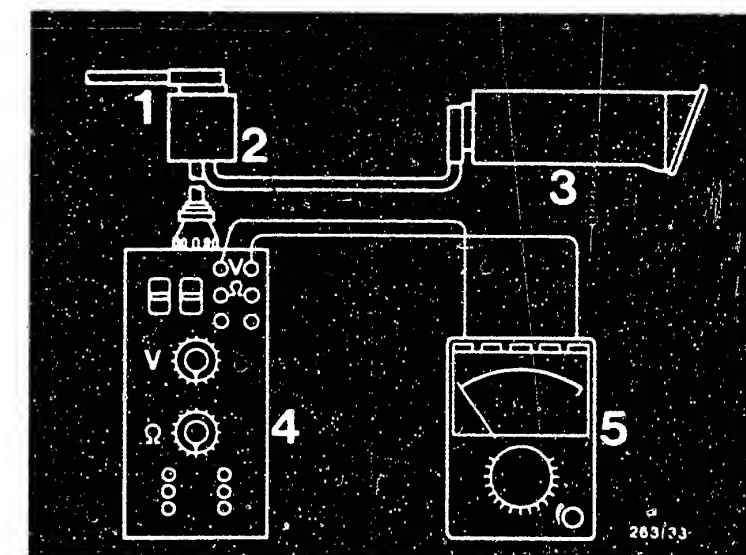


**E2**

Test with universal test adapter  
Opel trip computer

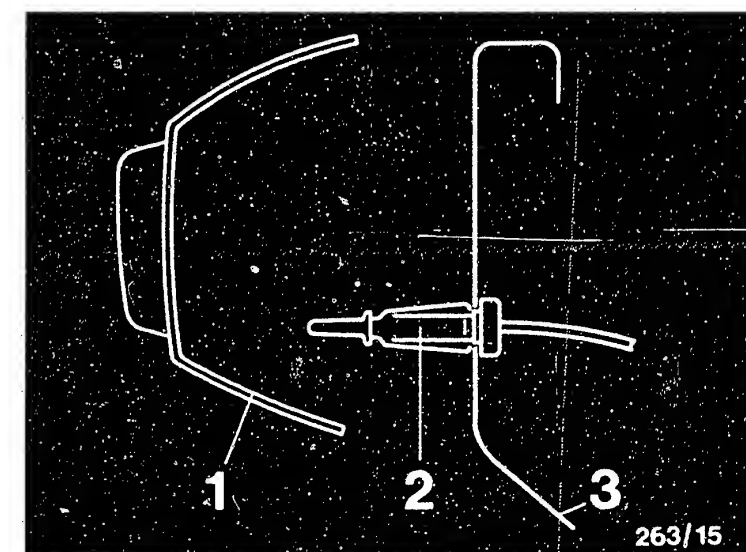


Test step 20			
Operation:		Reading:	Testing:
<u>Program switch "V" at position:</u>	12	On multimeter:  approx. 1.7 V  at room temperature (approx. 20°C)          If reading O.K., continue testing with next test step.	<u>Component:</u>  Outside temperature sensor with leads
<u>Program switch "Ω" at position:</u>	-		
<u>Measuring equipment:</u>  Multimeter (V range)			<u>Operation:</u>  Voltage measurement
<u>Measuring range:</u>  0 ... 5 V			<u>Malfunction:</u>  Voltage > 6 V or < 0 V
<u>Connection:</u>  Test socket red = positive black = negative			
<u>Operation in vehicle:</u> Ignition ON. Plug of adapter lead attached to TC.			



- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

- 1 = Front bumper
- 2 = Outside temperature sensor
- 3 = Front spoiler



### Trouble-shooting:

Outside temperature sensor mechanically damaged, e.g. broken off - visual examination (bottom picture). Reading  $\geq +80^{\circ}\text{C}$  at normal room temperature (approx.  $20^{\circ}\text{C}$ ) points to short circuit in lead.

Reading  $\leq -35^{\circ}\text{C}$  at normal room temperature (approx.  $20^{\circ}\text{C}$ ) points to open circuit in lead.

If the temperature display is obviously too low, this points to corrosion at the plug-in connections to the wiring harness of the trip computer. (Plug-in connections are behind instrument cluster).

Eliminate open circuit/contact resistance.

Replace defective outside temperature sensor or defective lead.

To remove, press together the two sprung latching lugs and withdraw outside temperature sensor from the rear.

**E3**

Test with universal test adapter  
Opel trip computer

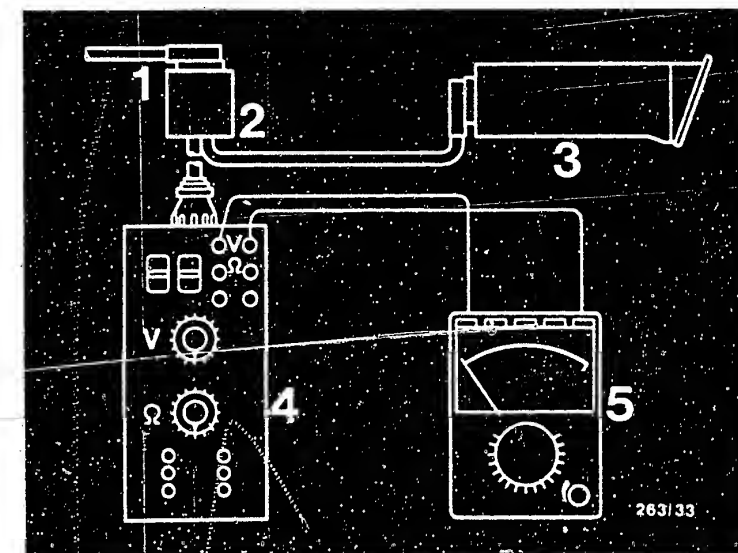


**E4**

Test with universal test adapter  
Opel trip computer



Test step 21			
Operation:		Reading:	Testing:
<u>Program switch "V"</u> at position:	13	On multimeter:  approx. 10 V   <	

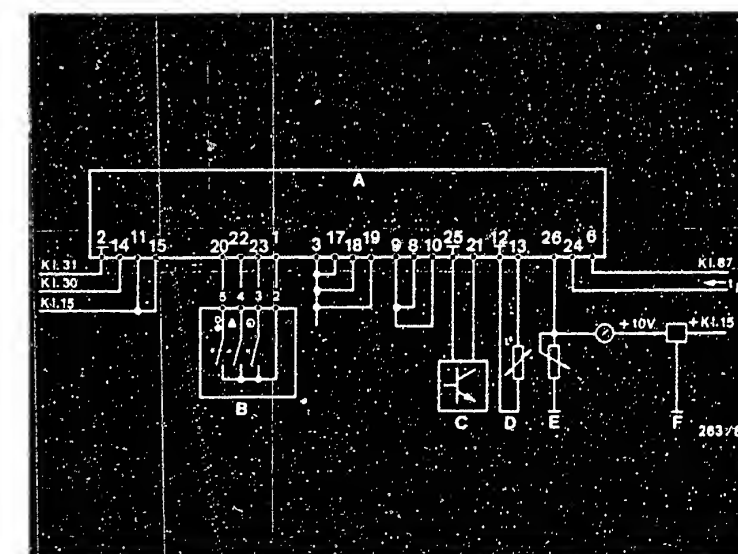


- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

F = Voltage stabilizer

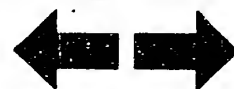
#### Trouble-shooting:

- Voltage stabilization for fuel gauge defective.
- Open circuit/contact resistance in lead to voltage stabilizer.
- Eliminate open circuit/contact resistance.
- Replace defective voltage stabilizer (on back of instrument cluster).



E5

Test with universal test adapter  
Opel trip computer

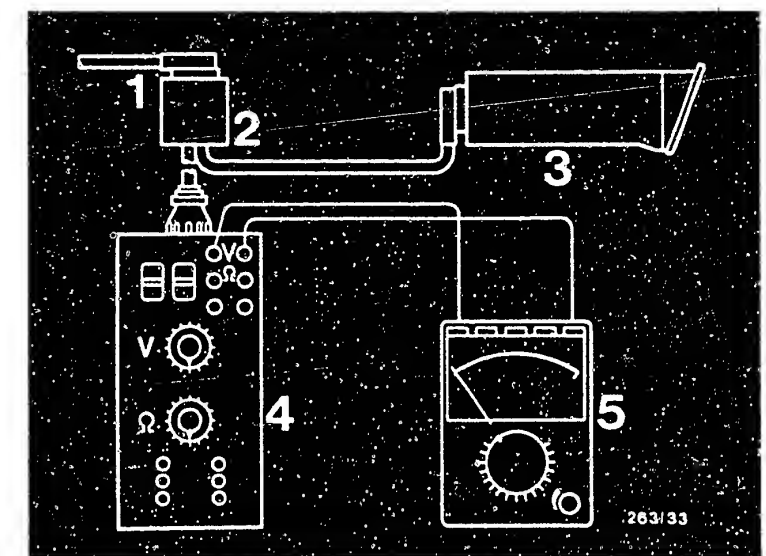


E6

Test with universal test adapter  
Opel trip computer



Test step 22			
Operation:		Reading:	Testing:
<u>Program switch "V"</u> <u>at position:</u>	13	On multimeter:  Tank full approx. 4.2 V Tank 3/4 full approx. 5.4 V Tank 1/2 full approx. 6.2 V Tank 1/4 full approx. 7.4 V Tank on reserve approx. 8.0 V Tank empty approx. 8.4 V   If reading O.K., continue testing with next test step.	<u>Component:</u> Tank sender with lead and fuel gauge
<u>Program switch "Ω"</u> <u>at position:</u>	-		<u>Operation:</u> Voltage measurement
<u>Measuring equipment:</u> Multimeter (V range)			
<u>Measuring range:</u> 0 ... 15 V			
<u>Connection:</u> Test socket red : positive black: negative			
<u>Operation in vehicle:</u> Ignition ON Plug on tank sender connected. Plug of adapter lead attached to TC			<u>Malfunction:</u> No reading or reading incorrect



- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

#### Trouble-shooting:

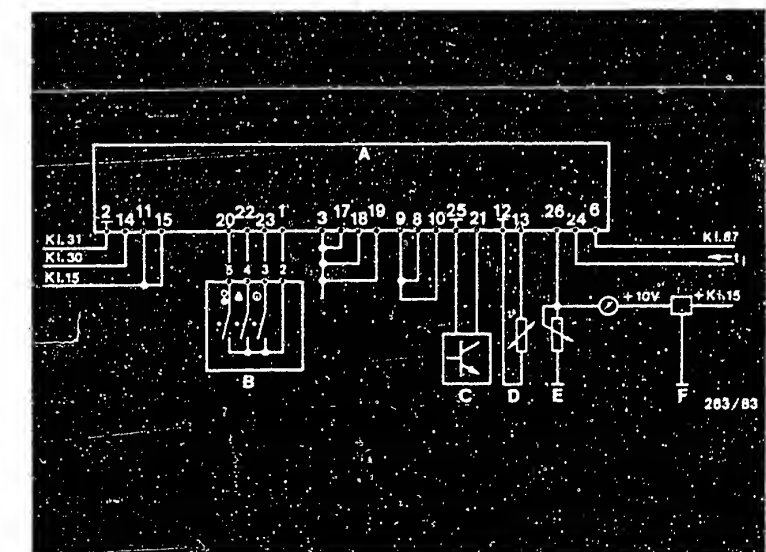
Tank sender defective and/or open circuit/contact resistance in lead from tank sender to trip computer pin 26.

Eliminate open circuit/contact resistance.

Replace defective tank sender/lead.

#### Note:

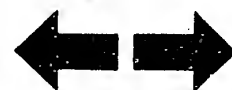
After replacing the tank sender, it is necessary to readjust the range on the trip computer.



Continued on E9/E10

**E7**

Test with universal test adapter  
Opel trip computer



**E8**

Test with universal test adapter  
Opel trip computer



## Setting the range (continuation of test step 22)

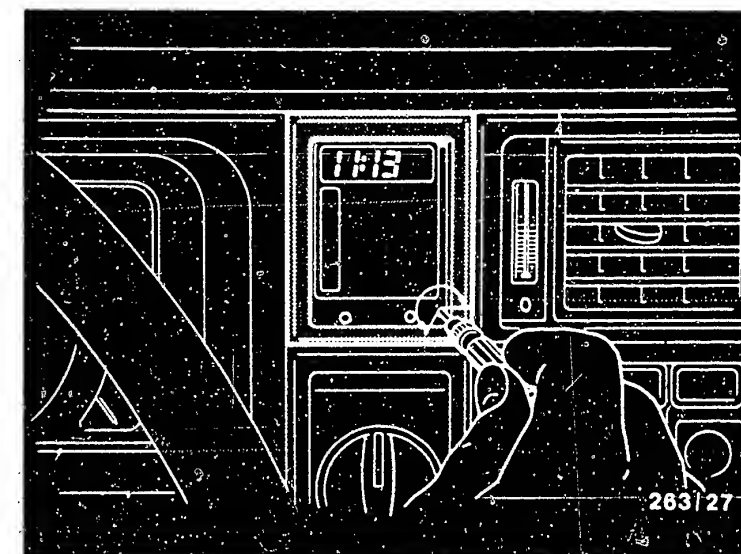
If the trip computer, tank sender or fuel tank has been replaced, it is necessary to re-adjust the trip computer.

1. Replace the positive connection to the electric fuel pump with a provisional lead. Remove the fuel hose from the fuel pump, attach a separate hose and introduce this hose into a fuel canister. Connect the provisional electric lead to the battery.  
- Fuel tank is emptied.
2. Pour precisely 15 l fuel into the fuel tank.
3. Switch on the ignition.  
Select function "calibrate range":  
Press function button and time button until all arrows come apart from the one for range. Release buttons together. Using a screwdriver (max. width of blade 1.5 mm, see illustration) set the range on the trip computer to 95 - 101 km (visible in display panel).

### Note :

potentiometer has a turning angle of max. 270°.

Turn carefully.



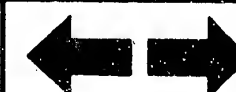
**E9**

Test with universal test adapter  
Opel trip computer



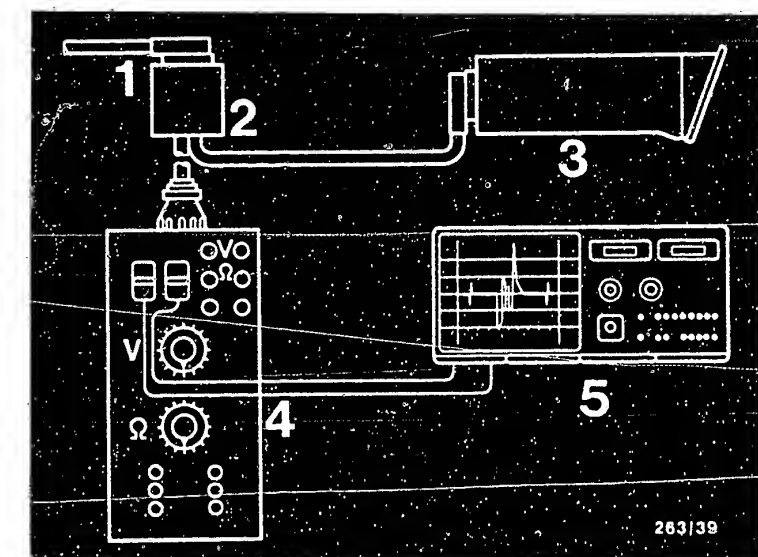
**E10**

Test with universal test adapter  
Opel trip computer





Test step 23			
<u>Operation:</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Program switch "V" at position:</u>	14	On oscilloscope of motortester:  Oscilloscope pattern similar to the one shown (see top picture in motor-tester).          If reading O.K., continue testing with next test step.	<u>Component:</u> Injection signal ( $t_i$ )
<u>Program switch "Ω" at position:</u>	-		
<u>Measuring equipment:</u> e.g. motortester MOT 201			<u>Operation:</u> See from oscilloscope whether injection signal present.
<u>Measuring range:.</u>  —			
<u>Connection:</u> Test wells on universal test adapter			<u>Malfunction:</u> No oscilloscope pattern
<u>Operation in vehicle:</u> Engine idling Plug of adapter lead attached to TC			



- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Motortester with oscilloscope of  $t_i$  signal

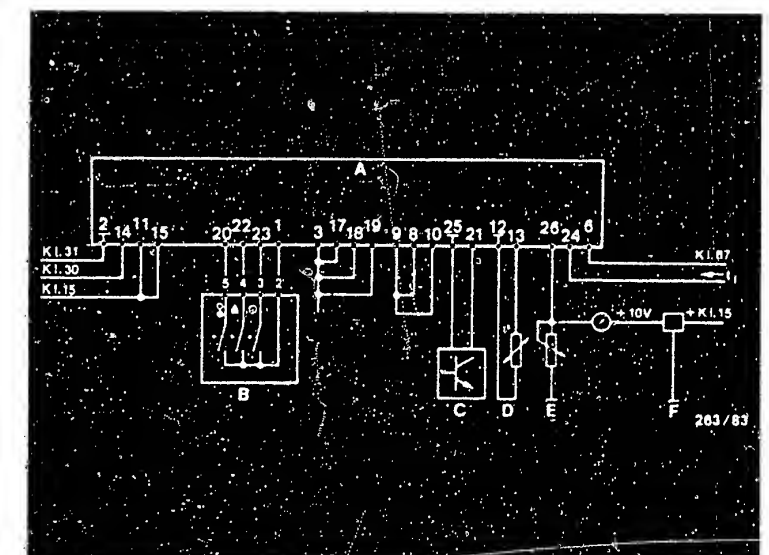
### Trouble-shooting:

Open circuit/contact resistance in plug connection/lead from L-Jetronic control unit to trip computer.

Using multimeter ( $\Omega$ ), test for continuity in lead from plug connector near L-Jetronic control unit (in firewall on right-hand side in front of front passenger) to trip computer pim 24.

Reading should be  $\infty \Omega$

Eliminate open circuit/contact resistance.



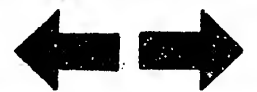
**E11**

Test with universal test adapter  
Opel trip computer

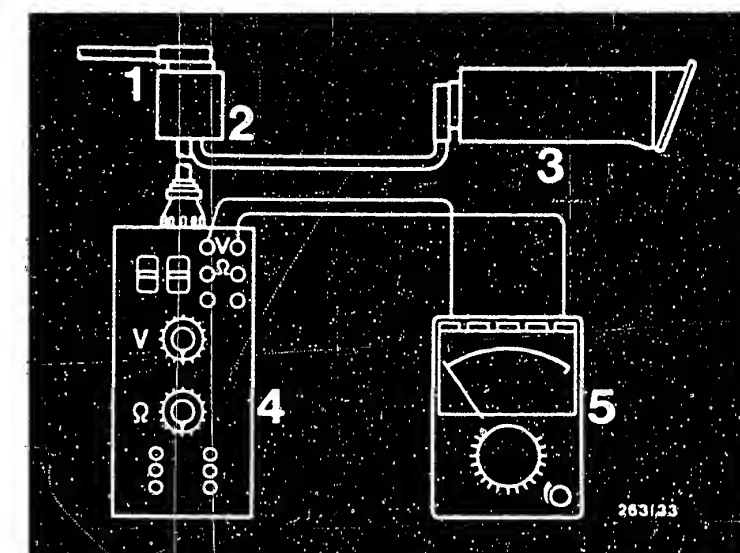


**E12**

Test with universal test adapter  
Opel trip computer

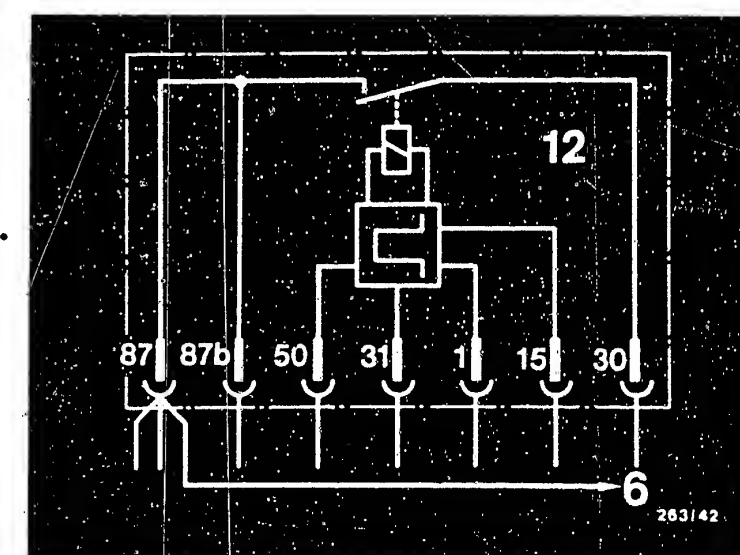


Test step 24			
Operation:		Reading:	Testing:
<u>Program switch "V"</u> <u>at position:</u>	15	On multimeter:  0 V	<u>Component:</u>  Lead from control relay term. 87 to trip computer pin 6
<u>Program switch "Ω"</u> <u>at position:</u>	—		
<u>Measuring equipment:</u>  Multimeter (V range)			<u>Operation:</u>  Information for trip com- puter that there is no voltage
<u>Measuring range:</u>  0 ... 5 V			
<u>Connection:</u>  Test socket red   = positive black = negative			<u>Malfunction:</u>  12 V across trip computer pin 6
<u>Operation in vehicle:</u> Engine stopped, ignition ON. Plug of adapter lead attached to TC.			
<u>Additional operation:</u>  Select actual fuel con- sumption with operator keyboard.			



- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead KDES 0003
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

6 = Lead from control relay (12) to trip computer pin 6



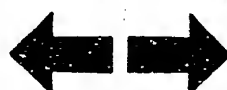
#### Trouble-shooting:

Control relay defective.

Lead from control relay term. 87 to trip computer pin 6 has connection with other live lead.  
Replace defective control relay/defective lead.

**E13**

Test with universal test adapter  
Opel trip computer

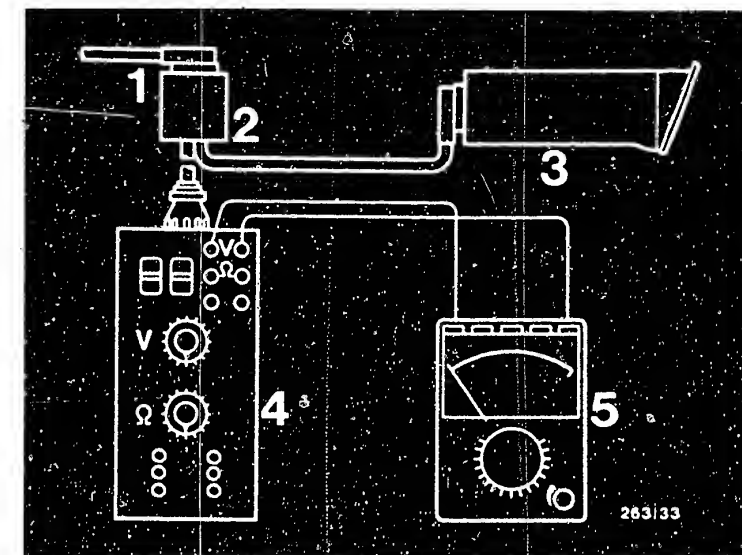


**E14**

Test with universal test adapter  
Opel trip computer

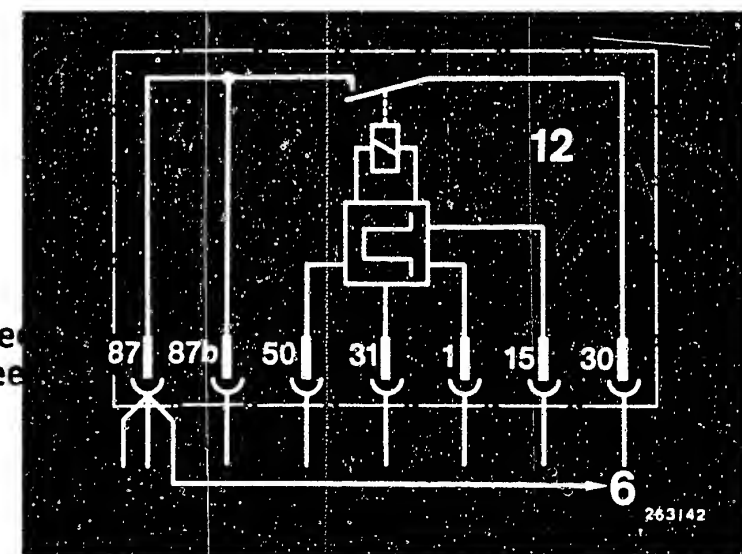


Test step 25			
Operation:		Reading:	Testing:
<u>Program switch "V"</u> at position:	15	On multimeter:  approx. $V_{batt}$	<u>Component:</u>  Lead from control relay term. 87 to trip computer pin 6
<u>Program switch "Ω"</u> at position:	—		
<u>Measuring equipment:</u>  Multimeter (V range)			<u>Operation:</u>  Information for trip com- puter that there is no voltage
<u>Measuring range:</u>  0 ... 5 V			
<u>Connection:</u>  Test socket red   = positive black = negative			<u>Malfunction:</u>  0 V across trip computer pin 6
<u>Operation in vehicle:</u> Engine running. Plug of adapter lead attached to TC.			
<u>Additional operation:</u>  Select actual fuel con- sumption with operator keyboard.			



- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead 0003
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

- 6 = Lead from control relay (12) to trip computer pin 6



#### Trouble-shooting:

Control relay defective.

Lead between control relay Term. 87 to trip computer pin 6 not connected.

Replace defective control relay/defective lead.

Trouble-shooting with universal test adapter on trip computer with sensors and leads complete. Disconnect universal test adapter and adapter lead. Re-install all components which have been removed.

Finally, set the time and perform functional test of trip computer.

Continued on E17/E18

**E15**

Test with universal test adapter  
Opel trip computer



**E16**

Test with universal test adapter  
Opel trip computer





### Setting the time

Dots between hours and minutes flash: clock is not set.

No operation:

Disconnect battery voltage from trip computer for 2 min and re-check function.

Setting the time:

Press the hour button (top illustration, arrow) (e.g. with ball point pen) and keep pressed until correct hour appears. Then release button. Dots between hours and minutes now flash.

Note: briefly pressing the buttons causes the respective display to advance by one unit. Continuous pressing causes automatic advance by 5 units per second.

Press the minute button (center illustration, arrow) until the minute display is correct. Then release.

Note: the clock is not yet in operation.

Starting the clock:

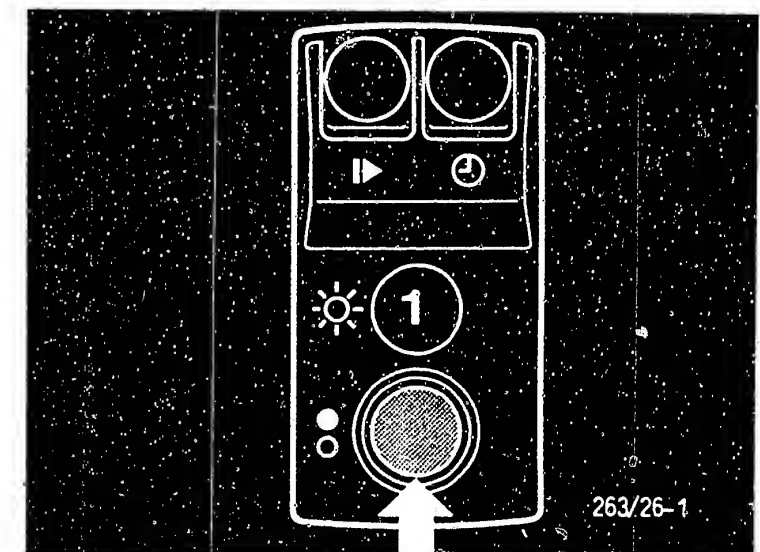
Press the reset knob on the keyboard (bottom illustration, arrow). The clock is now started at zero seconds.

Dots between hours and minutes no longer flash.

Note: Clock is fast or slow:

Under extreme conditions an error of approx. 2 min. per month is possible. Reset clock and check after 1 day. If complaint is justified, complete trip computer must be replaced.

Important: In the illustration below, item 1 (illumination button) is only installed up to 6.84.



**E17**

Test with universal test adapter  
Opel trip computer

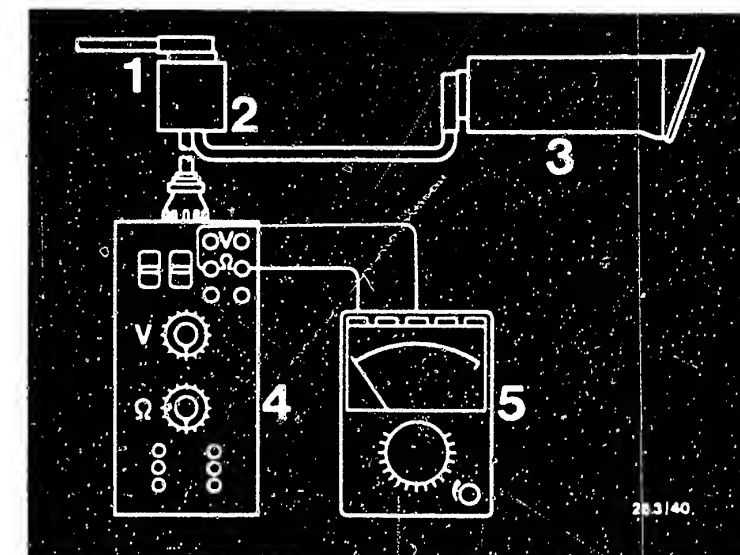


**E18**

Test with universal test adapter  
Opel trip computer



<u>Test step 26</u>		Only for TC up to 6.84 with illumination button and if encoding lead 1 present.	
<u>Operation:</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Program switch "V" at position:</u>	↓	On multimeter:  approx. 0 ... 10 Ω	<u>Component:</u> Encoding lead 1
<u>Program switch "Ω " at position:</u>	13		
<u>Measuring equipment:</u> Multimeter (Ω range)			
<u>Measuring range:</u> Ω x 1		If reading O.K., continue testing with next test step.	<u>Operation:</u> Resistance measurement
<u>Connection:</u> Test sockets blue			<u>Malfunction:</u> Reading = Ω
<u>Operation in vehicle:</u> Plug of adapter lead KDES 0002 attached to TC.			



- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead KDES 0002
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

### Trouble-shooting:

Open circuit/contact resistance in lead from pin 4 on 26-pin plug on trip computer to central ground.

Eliminate open circuit/contact resistance.

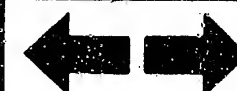
**E19**

Test with universal test adapter  
Opel trip computer



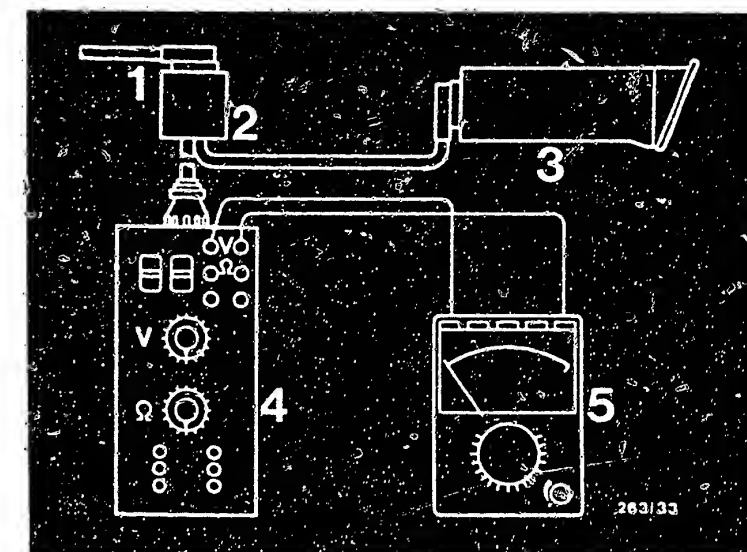
**E20**

Test with universal test adapter  
Opel trip computer

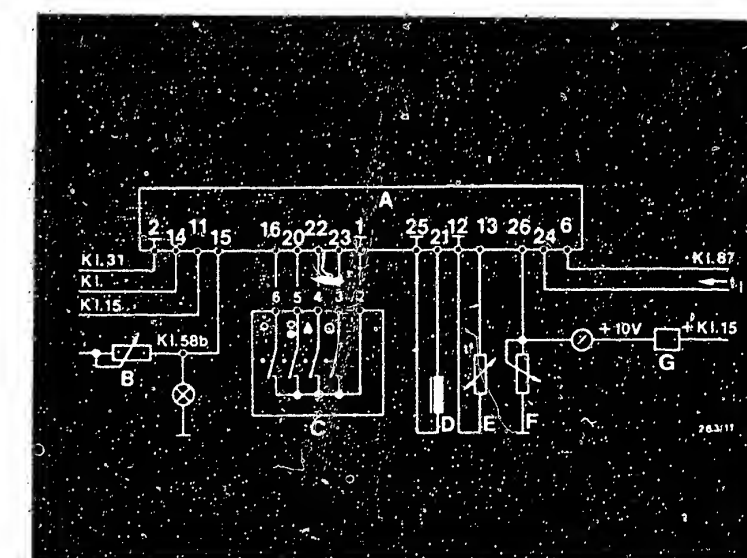


Test step 27 Only for TC up to 6.84 with illumination button

<u>Operation:</u>		<u>Reading:</u>	<u>Testing:</u>
<u>Program switch "V"</u> at <u>position:</u>	8	On multimeter:  5 ... 0 V  	



- 1 = 26-pin plug on vehicle wiring harness
- 2 = Adapter lead KDES 0002
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter



### Trouble-shooting:

Open circuit/contact resistance in plug connection in wiring harness between operator keyboard pin 6 and trip computer pin 16.  
Operator keyboard defective.

Eliminate open circuit/contact resistance.

Replace defective operator keyboard.

Continued on E23/E24

**E21**

Test with universal test adapter  
Opel trip computer



**E22**

Test with universal test adapter  
Opel trip computer

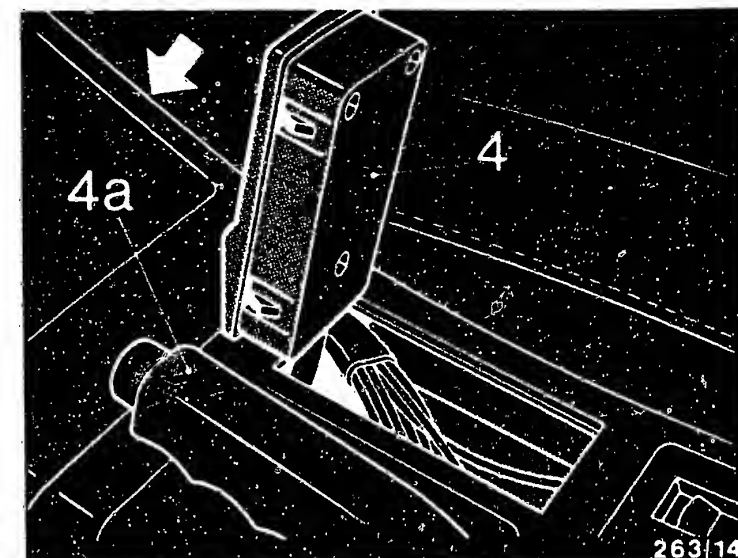


### Removing the operator keyboard (continuation of test step 27)

To remove the operator keyboard, unscrew the center console and pull slightly to the rear.

Undo the plug-in connection between operator keyboard and wiring harness at the front right behind the center console (arrow, right-hand picture).

Using a screwdriver, carefully raise the operator keyboard and remove (see right-hand picture).



4 = Operator keyboard  
4a = Handbrake

**E23**

Test with universal test adapter  
Opel trip computer



**E24**

Test with universal test adapter  
Opel trip computer



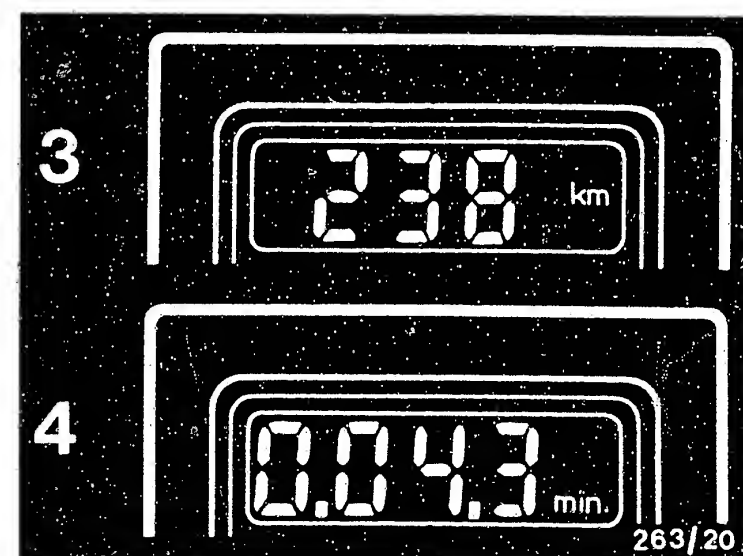
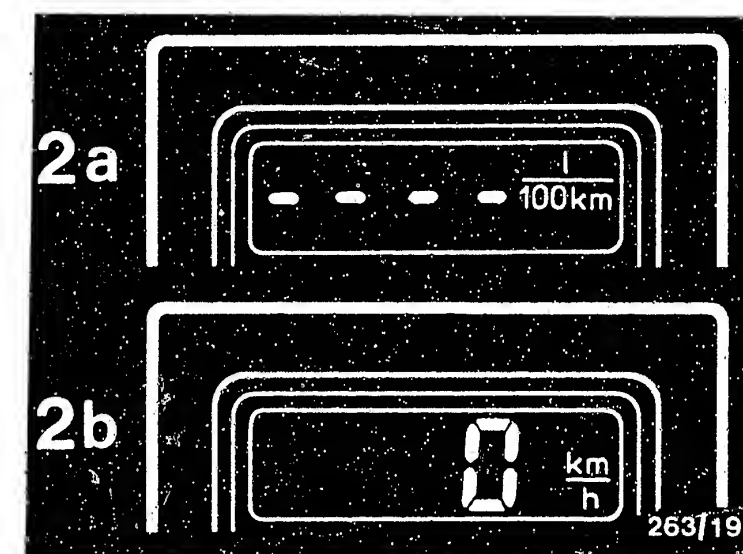
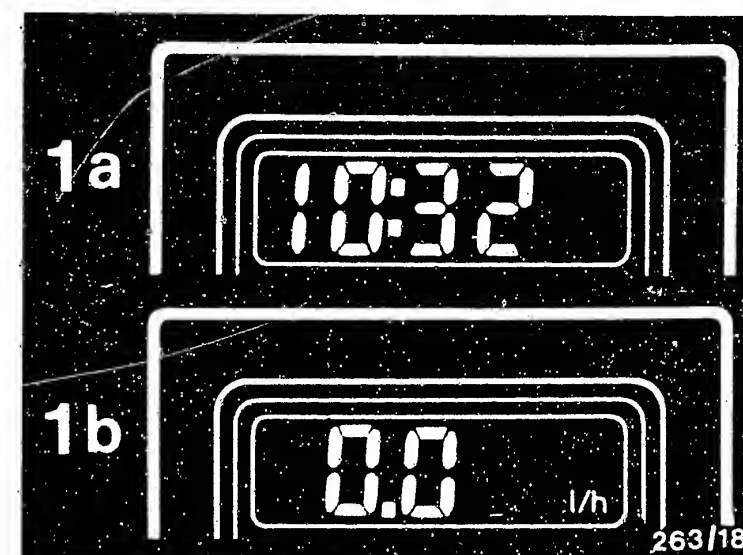
7. TC functional test (extract from operating manual) up to 6.84

Functional test with ignition 0 F F

1. Time only is indicated.  
No other functions can be selected (see Fig. 1 a).

Functional test with ignition 0 N - engine not running, start button was pressed.

1. Time continues to be indicated if other TC function is not selected (if range > 50 km and battery not disconnected) (see Fig. 1 a).
2. Selection of "inst. consumption". Inst. consumption 0.0 l/h is indicated (vehicle and engine stopped) (see Fig. 1 b).
3. Selection of "consumption Ø". No average consumption is displayed (see Fig. 2 a).
4. Selection of "speed Ø". Average speed 0 km/h is indicated (vehicle stopped), (see Fig. 2 b).
5. Selection of "range". Range is indicated in line with tank capacity (see Fig. 3).
6. Selection of "stopwatch". Time as of actuation of start button is indicated (see Fig. 4).
7. Selection of "ambient temperature". The actual ambient temperature is displayed (not illustrated).



**F1**

Trouble-shooting, functional test  
Opel trip computer



**F2**

Trouble-shooting, functional test  
Opel trip computer



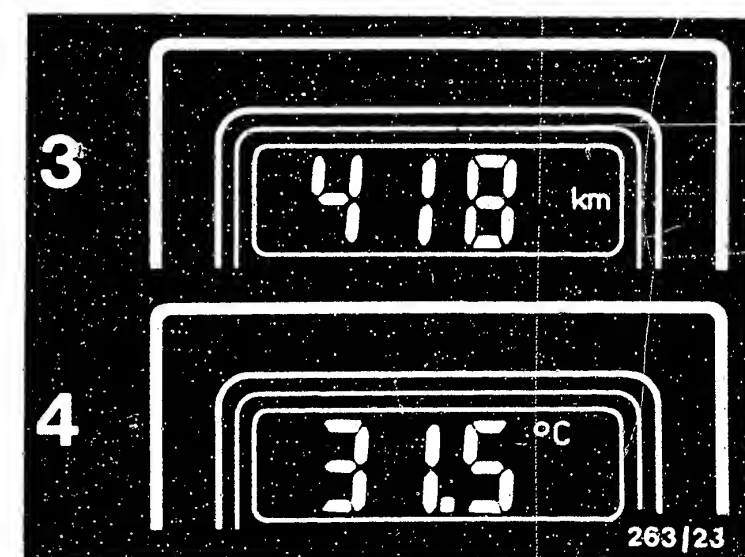
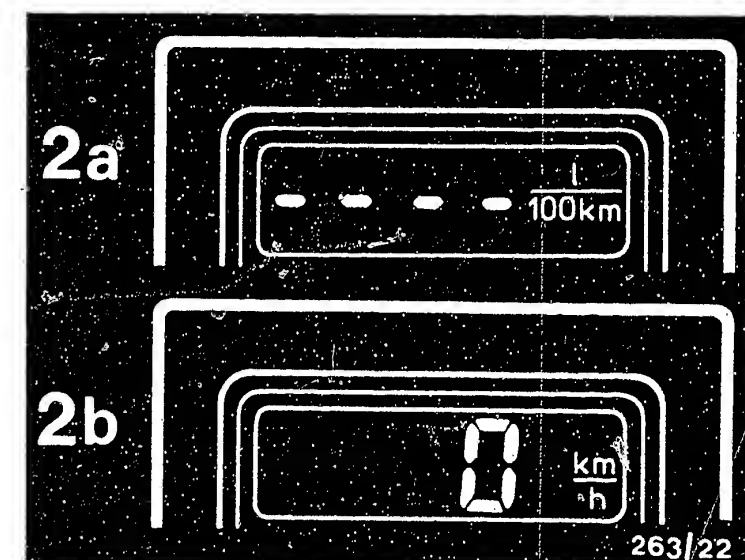
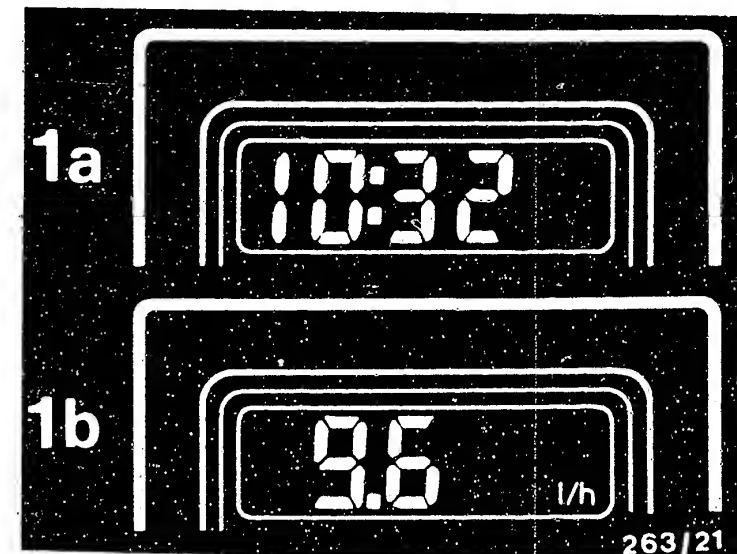


Functional test - engine running (idle speed), vehicle stopped

Start button pressed.

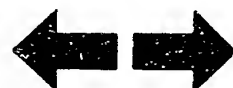
1. The time is indicated when the time selection button is pressed (see Fig. 1 a).
2. The actual instantaneous consumption in l/h is indicated when "inst. consumption" is selected (see Fig. 1 b).
3. ---- 1/100 km is indicated when "consumption 0" is selected (vehicle not moving) (see Fig. 2 a).
4. 0 km/h is indicated when "speed 0" is selected (vehicle not moving) (see Fig. 2 b).
5. A value corresponding to the tank capacity is indicated when "range" is selected (value between 0 and approx. 600 km) (see Fig. 3).
6. Time as of actuation of the start button is indicated when "stopwatch" is selected (not illustrated).
7. The actual ambient temperature is indicated when "ambient temperature" is selected (see Fig. 4).

If all these functions can be selected, the TC, the operating element and the input signals are O.K.



**F3**

Trouble-shooting, functional test  
Opel trip computer



**F4**

Trouble-shooting, functional test  
Opel trip computer



## 7.1 Functional test of trip computer (extract from owner's manual) as of 6.84

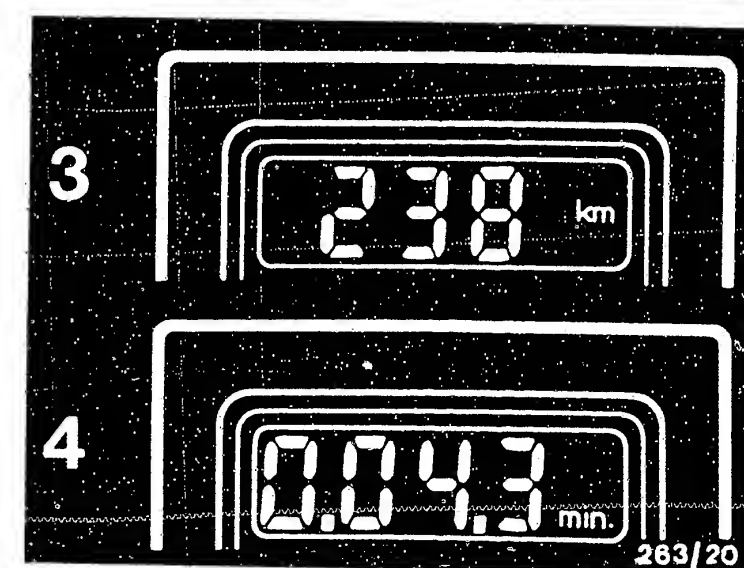
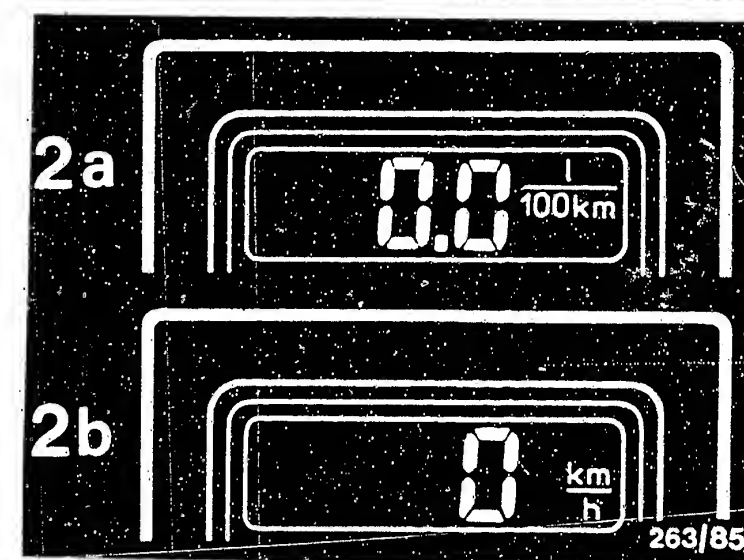
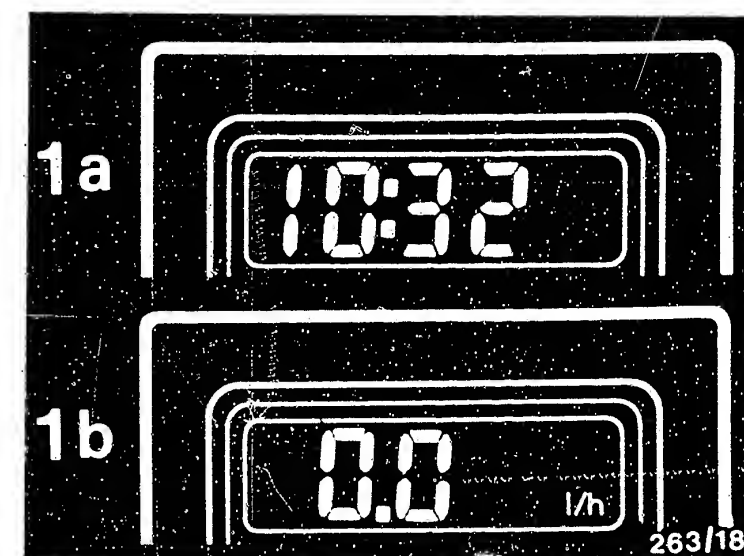
### Functional test with ignition 0 F F

#### 1. Only time is displayed.

It is not possible to select any other functions (see Fig. 1a).

Functional test with ignition 0 N - engine not running, start button has been pressed.

1. Without selecting another trip computer function, time continues to be displayed (if range > 50 km and battery not disconnected) (see Fig. 1a).
2. Select "actual consumption". Actual consumption 0.0 l/h is indicated (vehicle and engine stopped). (see Fig. 1b)
3. Select "ave. consump. Ø" : last stored value is indicated  
Select "ave. speed Ø" : last stored value is indicated
4. Press start button > 1 sec until 3 arrows appear.
  - 4.1 Ave. consumption Ø : 0.0 l/100 km (see 2 a)
  - 4.2 Ave. speed Ø : 0 km/h is indicated (see 2 b)
5. Select "range". (Miles to empty)
  - 5.1 After connecting  $V_{Batt}$  the range is calculated from ave. km (Fig. 3) ( $\hat{=}$  ave. 1 tank capacity) within 10 min.  
After connecting Term. 15 an extrapolation is made to the actual value.
  - 5.2 After a driving time > 30 min a range is indicated which is calculated from the fuel in the tank and the driving style of the driver.
  - 5.3 After refueling, the new fuel level in the tank can be taken over for calculations by pressing the start button > 1 sec.
6. Select "stopwatch". A time is indicated as of pressing the start button (see Fig. 4).
7. Select "outside temperature". The actual outside temperature is indicated (no figure).



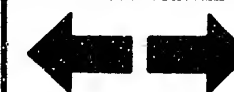
**F5**

Trouble-shooting, functional test  
Opel trip computer



**F6**

Trouble-shooting, functional test  
Opel trip computer



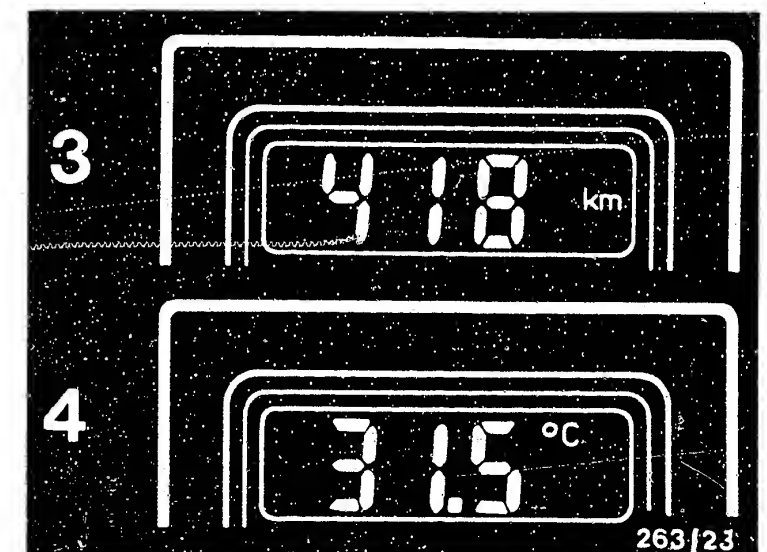
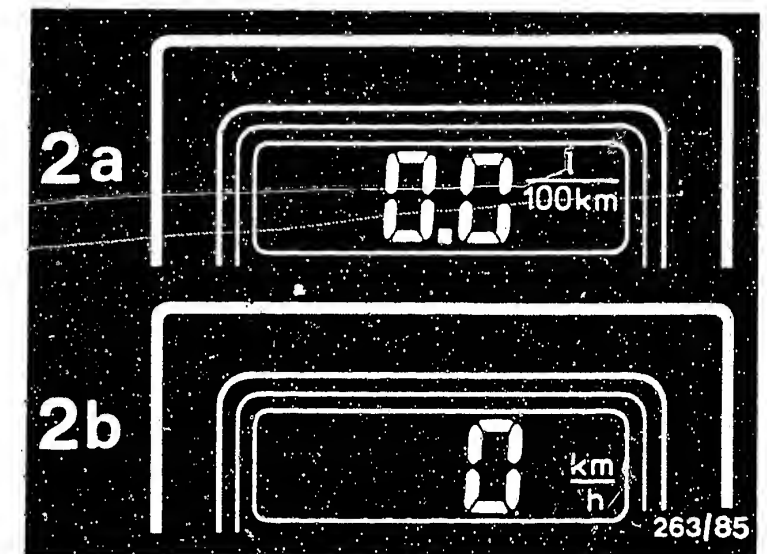
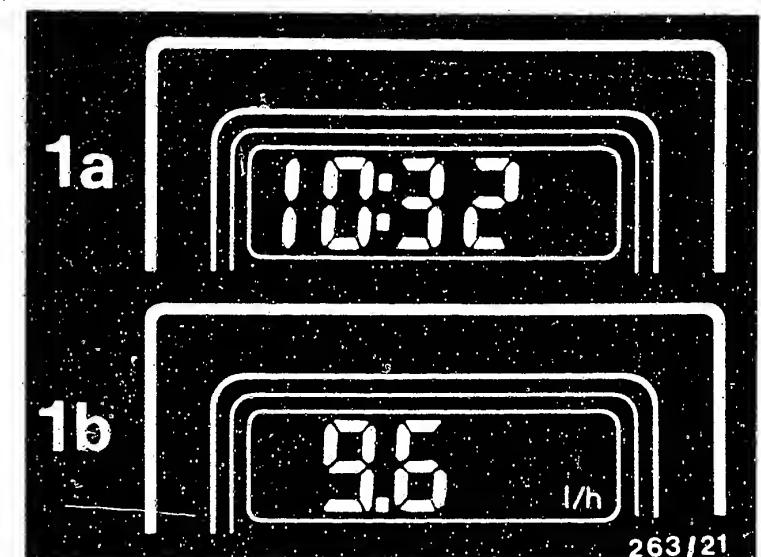


Functional test - engine running (idle speed), vehicle stationary

Start button has been pressed.

1. When priority button is pressed, time is indicated (see Fig. 1a)  
If pressed a second time, the previous display is indicated.
2. When "actual consumption" is selected, the actual consumption is indicated in l/h (see Fig. 1b)
3. When "average consumption" is selected, 0.0 l/100 km is indicated (vehicle stationary (see Fig. 2a).
4. When "average speed" is selected, 0 km/h is indicated (vehicle stationary). (see Fig. 2b)
5. When "range" is selected, a value depending on the level in the tank is indicated (value between 0 and approx. 600 km). (See Fig. 3)
6. When "stopwatch" is selected, a time is indicated as of pressing the start button. (no illustration)
7. When "outside temperature" is selected, the actual outside temperature is indicated. (see Fig. 4).

If all these functions can be selected, the trip computer and keyboard are in proper working order.



**F7**

Trouble-shooting, functional test  
Opel trip computer



**F8**

Trouble-shooting, functional test  
Opel trip computer



## Functional test, vehicle stationary (continuation)

Start button has been pressed.

Simultaneously press all 3 buttons of the keyboard.  
The functions appear at 1 sec. interval.

"Variant code"

"Display test"

"Vehicle electrical system voltage"

When the desired test function appears in the display, simultaneously release the 3 buttons.

### Display test:

The various segment blocks are automatically tested one after the other.

### Vehicle electrical system voltage:

The current vehicle electrical system voltage is indicated in volts without any unit of measure being given, with 2 decimal places after the point.

### Variant code = trip computer model:

A 3- or 4-digit number is output x.xxx.

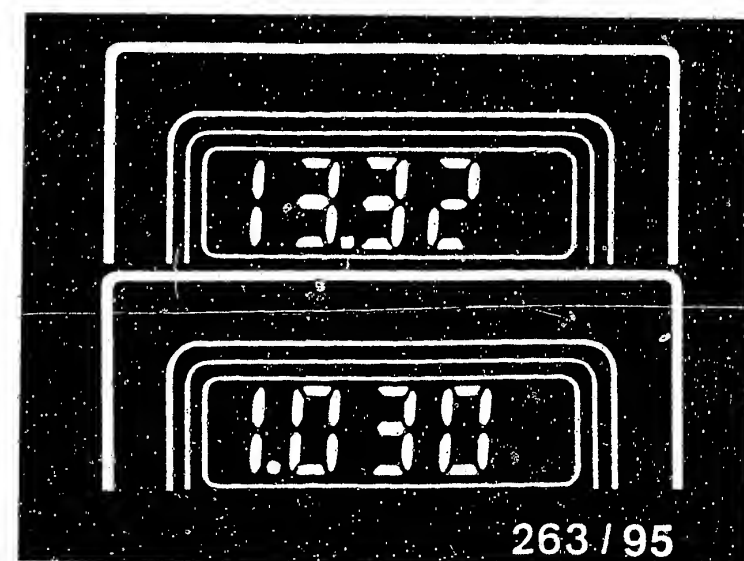
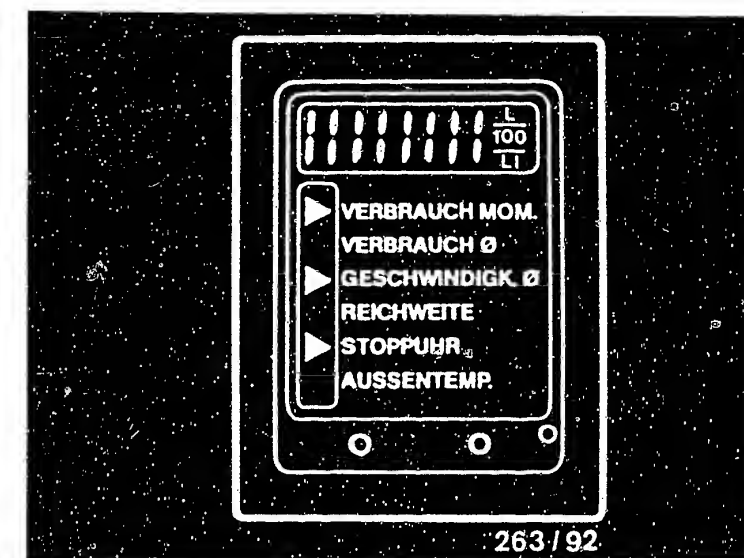
This contains the encoded features:

Senator/Monza

4/6 cylinder

2.5 / 3.0 bar

L / LE-Jetronic



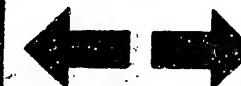
**F9**

Trouble-shooting, functional test  
Opel trip computer



**F10**

Trouble-shooting, functional test  
Opel trip computer



Plug No.	Model	Connect to plug 3	Encoding display
19	Jetronic L	yes	1
	LE2	no	0
18	No. of cylinders 4	yes	2
	6	no	0
17	Pressure (bar) 2.5	yes	4
	3.0	no	0
Switch S M	Senator tank		8
	Monza tank		0
	Displacement code No.	Connect to plug 9	
8	2420	yes	512
10	2776	yes	1024

Example	Code
Senator	8
L-Jetronic	1
6-cyl.	0
3.0 pressure	0
Displacement code No. 2420	<u>512</u>
Encoding display	521



# Technical Bulletin

Only for use within the Bosch organization. No to be communicated to any third party.

13...39

TRIP COMPUTER

VDT-I-263/101 En

After-sales service procedure

8.1984

Replaces Ed. 8.1983

## System description

With the trip computer it is possible to call up various functions and to read them off on a display unit. These include information on fuel consumption, average vehicle speed, outside temperature, time, etc. (The operating principle is described in Service Bulletin VDT-I-OPE 020 En).

## User

Opel is the first vehicle manufacturer to offer the trip computer for the vehicle models Senator and Monza (models as of 2.82).

## Components

Trip computer	0 263 001 ..
Operator keyboard	2 267 001 ..
Temperature sensor	0 335 500 ..

The precise part numbers are listed on the respective vehicle equipment microfiche AA.. .

The speedometer signal generator and tank sensor are neither made nor supplied by Bosch.

## Service parts/exchange parts

It is not possible to repair the components of the trip computer.

The computer is available as an exchange part (see microfiche WB.. and exchange-price list PD 02) and both the operator keyboard and the temperature sensor are available as service parts.

**N1**

Motor Vehicle Service Information

Opel trip computer



## Test concept

The system is tested in the vehicle using the universal test adapter in conjunction with a special system adapter cable as well as a commercially available multimeter.

Special tools are not required.

## Testers

Universal test adapter ETT 018.01, part no.  
0 684 101 801 (supplied in the usual manner).

Adapter cables KDES 0002/0003 can be requested for testing from the relevant RG/AV in your country.

## Technical documentation

Service Bulletin "New Product" VDT-I-OPE 020 En, trouble-shooting instructions and test specifications are on SIS microfiche OPE-00/E81.

## System training

Special training is not necessary.

## Retrofitting

This system is not intended for retrofitting.

## Warranty procedure

Components which are the subject of complaint should be sent in during the warranty period for warranty assessment to the responsible national agent.

Published by:

Robert Bosch GmbH  
Division KH  
Technical After-Sales Service (KH/VKD 2)

Please direct questions and comments concerning the contents to our authorized representative in your country.



# Motor Vehicle Service Information

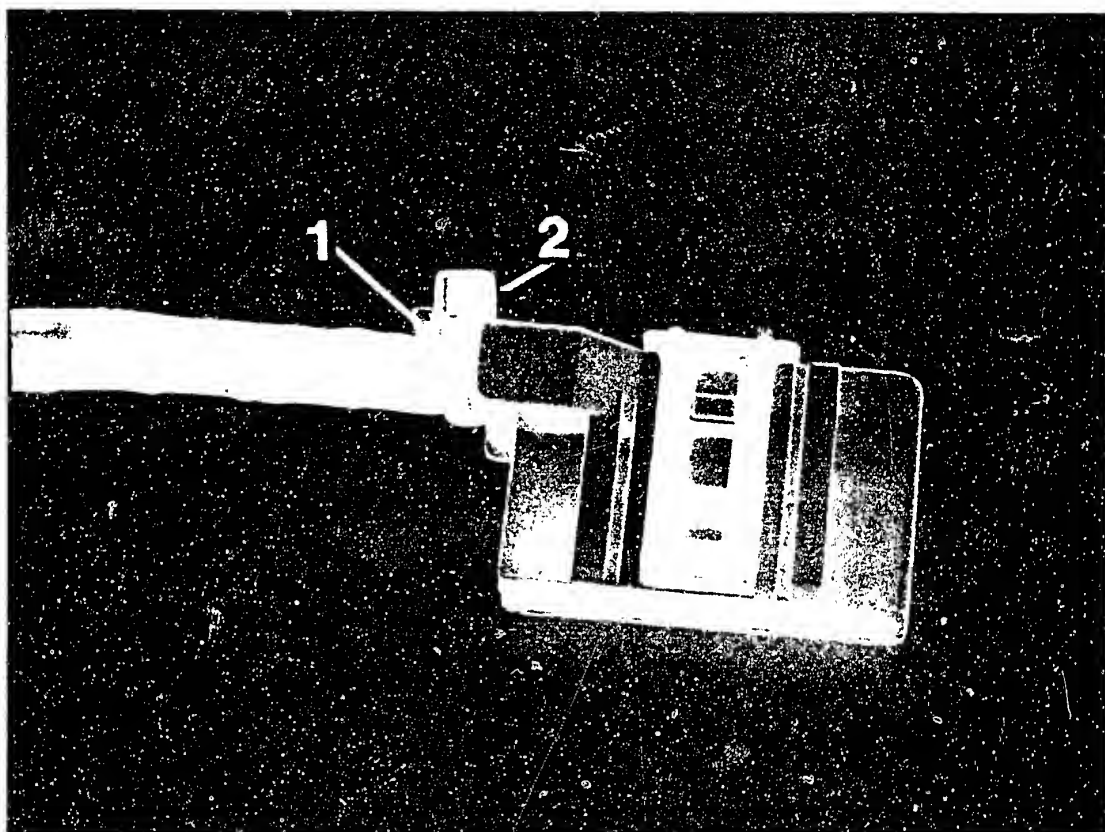
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## Electrical equipment

OPEL SENATOR / MONZA 2.5/3.0 1  
Modification to wiring harness when  
replacing trip computer

VDT-I-OPE 025 En

4.1984

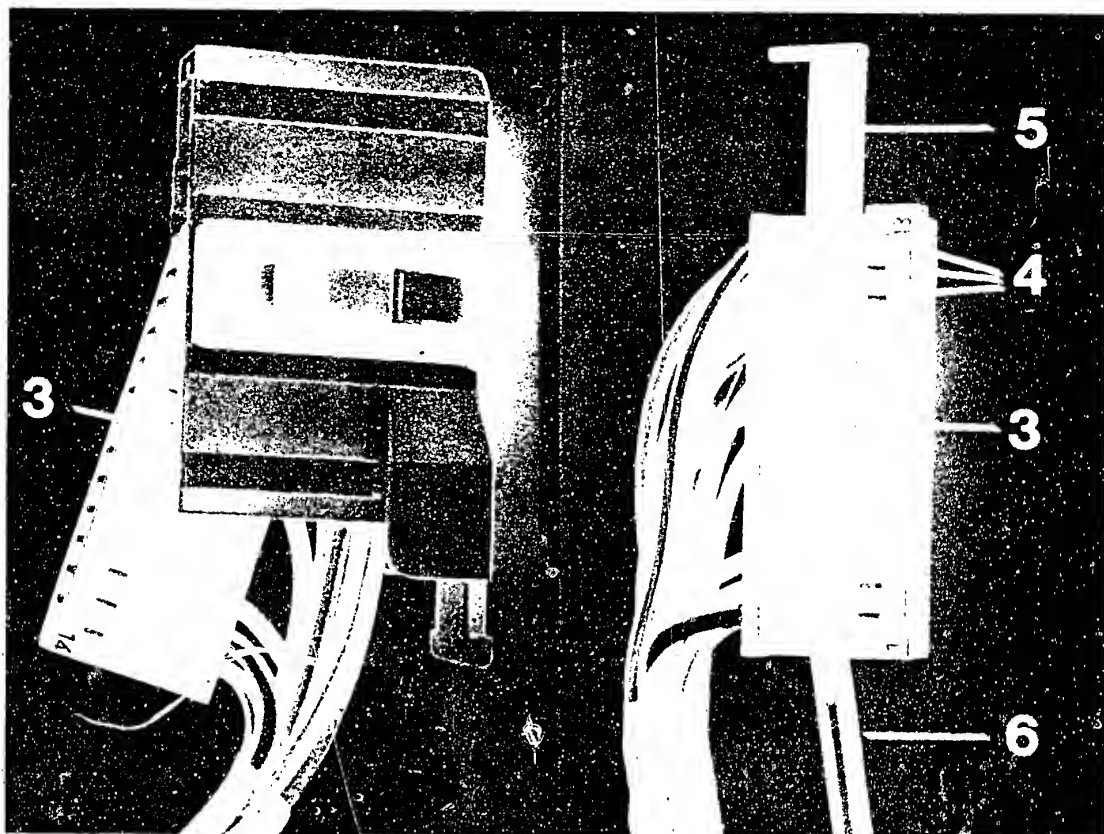


- 1 = Handle cover of trip computer plug (26-pin)  
2 = Clamping band

When replacing trip computers 0 263 001 000/001, ..002/003, ..006/007 ..008/009, ..010/011, ..014/015 with versions ..022/023, the original Opel wiring harness must be converted as follows:

- Cut through clamping band (2) on handle cover (1) (see picture).



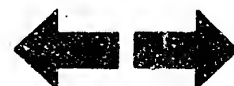


3 = Contact support  
4 = Minitimer

5 = Locking piece  
6 = Screwdriver

- Pull contact support (3) out of handle cover.
- Using a thin screwdriver (6), press locking piece (5) out of contact support (3).
- Insert code lead into trip computer plug in accordance with the following table (required as external wiring-harness coding for trip computers 0 263 001 022/023).

2 code leads with attached minitimers are enclosed with the aftermarket versions of the trip computer. In addition, a new cover for the operator control panel (without illumination button) is enclosed. It can be changed after loosening 3 screws on the underside of the operator control panel.





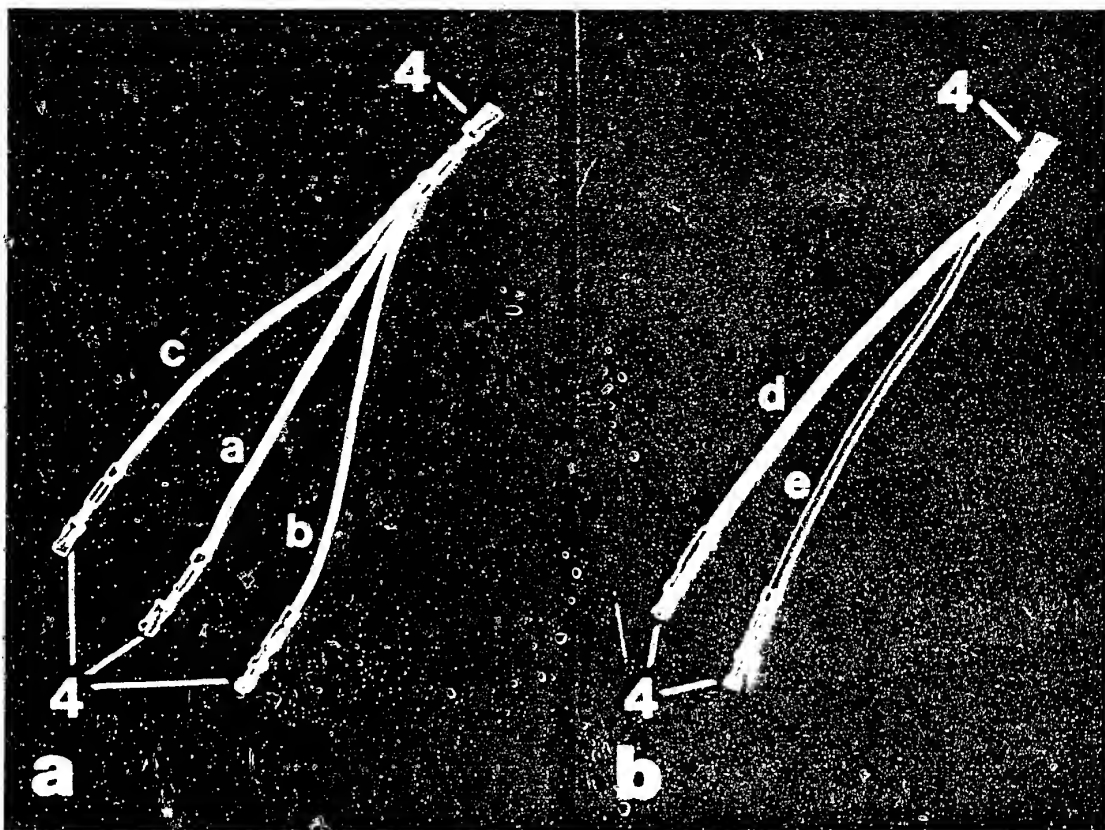


Fig. a = Code lead 1    Fig. b = Code lead 2

4 = Minitimer

a = Blue, b = Green, c = Red, d = Black, e = white

Code lead 1 is required for detecting Jetronic (L/LE2),  
no. of cylinders (4/6) and pressure (2.5 - 3.0 bar).

Code lead 2 is required for detecting distance/turns  
ratio.



Table for installation of code lead 1 in trip computer plug

Trip computer model being replaced		Code lead 1 (3-pin) Common minitimer to plug location 3		
Bosch Part No.	GM Part No.	Blue lead to plug loc. 19	Red lead to plug loc. 18	Green lead to plug loc. 17
0 263 001..	90 148..			
000/001	630	x	o	o
002/003	629	x	o	x
006/007	949	x	o	o
008/009	948	-	-	-
010/011	808	-	-	-
014/015	645	o	x	x

- = Additional code lead not necessary

x = Connect to code leads

o = Disconnect code leads



Table for installation of code lead 2 in trip computer plug

Trip computer model being replaced		Code lead 2 (2-pin) Common mini-timer to plug loc.9		Indicated version code in trip computer during "Test"	
Bosch Part No.	GM Part No.	Black lead to plug. loc.8	White lead to plug loc.10	Senator	Monza
0 263 001..	90148..				
000/001	630	o	x	1033	1025
002/003	629	o	x	1037	1029
006/007	949	x	o	521	513
008/009	948	x	o	520	512
010/011	808	o	x	1032	1024
014/015	654	o	x	1038	1030

- = Additional code lead not necessary

x = Connect to code leads

o = Disconnect code leads

After installing the code leads, re-insert locking piece and assemble wiring-harness plug.

Secure cable exit by means of clamping band on handle cover.

Correctly set model switch Senator/Monza on underside of trip computer.

After installing the trip computer, it is possible to check by means of the version code whether the code leads have been correctly connected:

Simultaneously press the 3 operator buttons for at least 1 second. The version code appears. Simultaneously release operator buttons again. Compare version code with table above.



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